# THE COLORADO SCHOOL OF MINES MAGAZINE

MAY - 1926
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# COLORADO SCHOOL OF MINES MAGAZINE

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M. R. (MONTY) BUDD, '24, *Editor*

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## CONTENTS



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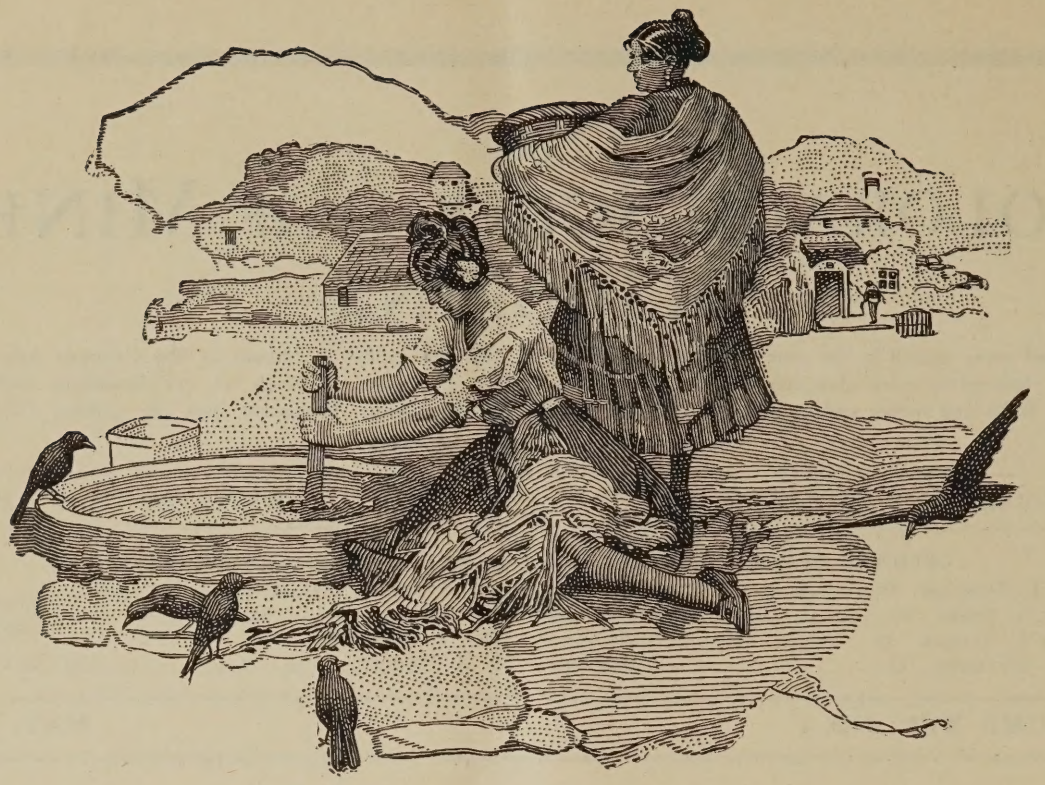

# Crows

In a field in sunny Spain stands a stone mortar. Crows hover around it, picking up bits of grain and chaff—cawing.

Here Marcheta, in the fresh beauty of her youth, will come to pound maize. For years she will pound maize. The stone will stand up under the blows; not a dent has the muscle of three generations of women made upon it. But the crows will hurl their black gibes upon a woman aging early and bent with toil. *Old Marcheta*—still in her thirties.

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The
COLORADO SCHOOL OF MINES
MAGAZINE

VOLUME XVI. MAY, 1926 NUMBER 1

# The Engineering Profession

By Prof. J. R. Morgan

(Address Delivered Mines Radio Night over KOA)

THOMAS Henry Huxley, the scientist, was once scheduled for a lecture in Dublin. His train arrived late. He rushed into a cab and the only order he gave was, 'drive fast." The cabman dashed away and after several minutes of questionable speed, Huxley leaned forward and said to the cabman, "Say, driver, where are you going?" "I don't know, sir, but I'm driving fast," was the reply.

The youth of today are driving fast and justifiably so. Well directed speed is a very essential element of success but until a definite destination is decided upon, this question of "whither bound and why" is a puzzling one to both boy and parent.

In attempting to choose a life work, let us immediately eliminate that trite but ever-present argument of "over crowded." Any legitimate profession offers ample opportunity to a young man of strong character, of ability, energy, aggressiveness, and training. True, the entries at the outset in any profession are many, and one is jostled considerably for a time, but at the finish you notice that there are very few footprints on the highest peaks of progress. There lie the real opportunities.

What is this engineering? It is an intelligent application of the laws of the universe. It is a vision of the possibilities which the future may hold. It is the meter stick by which we measure the world's progress.

What does it do? It looks beyond the horizon of today and builds for tomorrow. It sends man into the boundless reach of space above, as well as into the fathomless depths below, and returns him safe. It takes the living thought from the mind of man and transmits it to the ends of the earth. It teaches man the combination to the massive vaults of Nature's storehouse and delegates him to distribute her treasures and her power for the practical use of mankind.

What type of man does this engineering require? Well balanced men; men of mental and physical strength; men of good character, courage and leadership; honest men, sympathetic men, human men; men who will accept a challenge and fight through to success; men who crave contact with Nature's untamed forces and who will struggle until they overcome those forces; men of scientific imagination and sane reasoning; men who can think straight, accept criticism and stand firm. This is the type of man that successful engineering requires.

What does this engineering profession have to offer to the young man who, by instinct, is creative, inventive, and a builder? Engineering training develops these qualities in the student and then guides him to the point where he has an opportunity for national recognition. Progressive Italy sends as her ambassador to the United States an internationally known engineer, Prince Caetani, Herbert Hoover, an engineer of internatonal reputation, holds one of the most responsible secretaryships on the President's cabinet. The territorial governor of Alaska, George A. Parks, is a graduate mining engineer from the Colorado School of Mines.

Big industries whose efforts know no confines, whose influence reaches every class of men, whose ardent desire for legitimate supremacy brooks no interference, whose efficient organization counts no cost in order to bring about desired results—these are the business enterprises which are demanding alert, dependable, and well trained engineers.

The field of scientific research seeks the engineering type with a keen mind, vigorous body and moral stamina; one who has been trained to think clearly, act fearlessly and get results. There has been but one Steinmetz, one Edison, one Marconi, and one Pupi. There is room and urgent demand for many such men as these in this age of super-accomplishments.

Not only may the engineering student expect in the future a demand for his efforts in his specialized field, but in the political and business world, and in scientific research. This demand comes after much investigation on the part of the employer which has convinced him that the engineering type of man, with his ability to think straight, to analyze carefully and to handle men, is the individual who will be the biggest asset to his business.

To the young man who wishes to take part in the world's progress, who wishes to be a leader of men, and who is not content with being an average success is offered unlimited opportunities in the field of engineering at home or abroad.

Whatever your temporary discouragements, don't forget that,

"The best verse hasn't been rhymed yet,
The best house hasn't been planned,
The highest peak hasn't been climbed yet,
The mightiest rivers aren't spanned.
Dont worry and fret, faint hearted,
The chances have just begun,
For the best jobs haven't been started,
And the best work hasn't been done."

# Low Temperature Carbonization†

By Dr. A. C. Fieldner*

The low temperature carbonization of coal is a subject of special interest at this time when some concern is being felt as to the future supply of petroleum. You are no doubt intensely interested in the technical and economic possibilities of recovering oils and motor fuels from the coal, lignite, and shale deposits of the Western states. I am including shale in my discussion because there is no sharp line of demarcation between the carbonization processes for coal and shale. In fact there is much more difference in the types of apparatus required for coking and non-coking coals than there is between an oil shale and a lignite carbonizing plant. Lignite, sub-bituminous, or other non-coking coal can be carbonized in a Scottish oil shale retort, as can oil shale be distilled in most styles of low temperature carbonization retorts. Therefore, what I shall say about carbonization processes and principles is applicable in many respects to shale as well as to coal. In the restricted time of a single lecture I must necessarily limit myself to fundamental principles and to brief descriptions of representative types of processes. For further information you are referred to four recent textbooks[1] on the subject and innumerable papers in the technical press. However, one must remember that most of these articles are written by incurable optimists. Some of them have processes to promote, others are simply engineering editors or correspondents, who do not have personal knowledge of the process but accept the inventors' and promoters' statements at face value.

### What Is Low-Temperature Carbonization

Low-temperature carbonization of coal may be defined as the heat treatment of coal in the absence of air at temperatures of from 450 to 700° C. as distinguished from the usual high-temperature carbonization at temperatures of 900 to 1200° C. The aim is to keep the temperature low enough to prevent the decomposition of the primary tar and thus obtain the maximum yield of liquid products and at the same time produce a solid smokeless fuel. At 450-500° C. the tar yield is from two to three times that of the ordinary high-temperature coking or gas-making process.

### Aims of Low-Temperature Carbonization

The reasons for the many attempts to devise commercial low-temperature processes are the following:

1. To obtain a larger yield of liquid fuels than can be obtained from high-temperature processes.

2. To provide a smokeless, easily ignitible solid fuel for domestic purposes.

3. To obtain a dry, easily pulverized, highly combustible, low-volatile material for pulverized fuel furnaces, with coincident by-product recovery.

4. To obtain a substitute for low-volatile semi-bituminous coal, for mixing with high-volatile swelling coals in order to make a suitable dense metallurgical coke.

Of these four objectives, the one common to all low-temperature processes is the increased oil or tar yield. Liquid fuel, especially gasoline, seems essential for the continuation of our present highly developed system of automotive transportation. Petroleum resources are much more limited than coal and may become inadequate to meet the growing demands within the present generation, hence the interest in methods for obtaining this convenient form of fuel from our very much larger supply of solid fuel. European countries which have no internal petroleum resources have a particularly keen interest in this problem, because of the need of a home source of petroleum substitutes in case of being shut off from foreign supplies during an extended war. England felt this need during the last war to such an extent that the Government established a Fuel Research Station which has for one of its important problems the development of a commercially feasible low-temperature process. Germany actually did install and operate a number of low-temperature carbonization plants during the latter years of the war.

There is in England a second objective almost as important as the first one—namely, the manufacture of an easily ignitible smokeless fuel for open grate fires. The Englishman must have his cheerful open grate, despite its low efficiency and the pall of smoke created by thousands of soft coal fires. Abatement of this domestic source of smoke by providing a suitable smokeless fuel was the principal object of the early experiments in England.

In Germany and in France low-temperature carbonization research is undertaken principally for the production of gasoline and fuel-oil substitutes, and for manufacturing a low-volatile semi-coke for mixing with high-volatile gas coals to produce dense metallurgical coke. There is but little interest at the present time in a smokeless domestic fuel. German engineers are investigating the possibilities of combining low-temperature carbonization with powdered fuel-firing or burning the semi-coke or chain-grate stokers in large central power plants.

Considerable attention has also been given to combining low-temperature distillation with complete gasification of the resulting semi-coke in by-product gas producers.

### Methods of Heating

The fundamental difficulty in carbonizing coal at low temperatures is in transferring heat to the coal in a reasonably short time when using a relatively low-temperature gradient. Coal is a poor conductor of heat. It takes much longer to transfer the necessary amount of heat through a given volume of coal when the retort walls are at a temperature of 500° C. than when they are at 1,200°, as in the usual high-temperature process. Since the cost of the operation depends to a large degree upon the installation charges per ton of coal carbonized, it be-

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†Part of this paper was given in lectures at Johns Hopkins University, April 29, 1925, and at Colorado School of Mines, Golden, Colo., March 11, 1926, under the auspices of the American Gas Association. Published by permission of the Director, U. S. Bureau of Mines.

*Chief chemist, U. S. Bureau of Mines, and superintendent, Pittsburgh Experiment Station.

comes necessary to accelerate the rate of carbonization, either by spreading the crushed coal in a thin layer on a heated surface or by agitating the coal, bringing fresh portions continually in contact with the heated walls or by passing large volumes of hot producer gas, products of combustion, or superheated steam through the mass of broken coal.

Differentiating on the basis of method of heating, the various processes fall into two classes—namely, (1) externally heated retorts, in which the coal to be carbonized is supplied with heat through the walls of the retort and in which the products of distillation are not diluted with flue gas and (2) internally heated retorts in which the coal to be carbonized is heated by direct contact with hot gases, or superheated steam which is passed through the retort in intimate contact with the charge.

Carbonization processes may be intermittent, in which the coal is charged into an empty retort and remains there until distillation is completed, when the entire mass or coke or residue is discharged at one time, or they may be continuous, in which charging and discharging is continuous or in small increments.

Present high-temperature by-product coking practice is intermittent, as intermittent processes generally produce firm and lumpy coke. Continuous vertical retorts are coming into considerable use in the gas-making industry as continuous processes favor larger outputs and cheaper operation; the coke, however, has somewhat inferior physical properties to that produced by intermittently charged retorts.

With respect to the style of construction, retorts may be classified as follows: (1) Oven types, usually of rectangular shape, as the standard by-product oven; (2) vertical shaft types, as in the vertical gas retorts or the Scottish oil-shale retort; and (3) rotating cylinder types, vertical, horizontal or inclined, similar to revolving driers or cement kilns; the cylinder type may also be stationary, with a revolving internal stirrer.

A convenient classification for the many proposed processes is given in Table 1.

TABLE 1—CLASSIFICATION OF LOW-TEMPERATURE CARBONIZATION SYSTEMS

A. Externally heated retorts; coal in thin layers not stirred.
1. Vertical layers of coal in narow retorts.
2. Horizontal thin layers of coal.
B. Externally heated retorts; coal stirred in contact with heated surfaces.
1. Vertical retorts.
2. Horizontal retorts.
a. Stationary retorts with internal stirrers.
b. Rotating cylinders.
3. Retorts with coal stirred on a flat heated surface.
C. Internally heated retorts; coal in direct contact with hot gases or liquids.
1. Hot gases generated by air or air and steam blown into the retort.
a. Coal charged in lumps or briquets.
b. Coal charged in pulverized form.
c. Complete gasification.
2. Hot gases or vapors generated outside the retort.
a. Combustion products.
b. Producer gas.
c. Water gas.
d. Coal gas.
e. Superheated steam.
f. Combinations of above.
3. Melted lead in contact with coal.
D. Two-stage carbonization, to control the sticking properties of coal.

Only a few of the better known processes of some of the various types can be described briefly in the time allotted for this lecture.

## EXTERNALLY HEATED RETORTS: COAL IN THIN LAYERS NOT STIRRED

### Vertical Layers of Coal in Narrow Retorts

*Parker process.*—The latest modification of the coalite process of the Low Temperature Carbonization Co., Ltd., of England, is a return to the small diameter intermittently charged cast-iron vertical retort originally proposed by Parker in 1908. Each retort consists of a solid casting of 12 tubes in a double row of six, each 4½ inches inside diameter at the top, tapering to 5½ inches in diameter at the bottom, and 9 feet long; 32 of these retorts constitute a battery which has a capacity of 50 tons of coal per 24 hours.

Tests[2] of this plant by the Fuel Research Station of England showed the following yields:

TABLE 2—RESULTS OF TESTS BY FUEL RESEARCH STATION OF BARNSLEY PLANT

| | |
|---|---|
| Coke (6½ per cent volatile matter), per cent | 70 |
| Gas (700 B.t.u. per cu. ft.), cubic feet | 5620 |
| Crude tar (dry), U. S. gallons | 20 |
| Ammonium sulphate, pounds | 12.2 |
| Crude light oil from gas, gallons | 1.9 |
| Refined motor spirit to 170° C., gallons | 1.5 |
| Retort temperatures, deg. C. | 600 to 800 |
| Volatile matter in coal, per cent | 35 |

It will be observed that the temperatures were from 100 to 300° C. above that of the usual low-temperature processes. This accounts for the volatile matter in the coke being 6 per cent, instead of the normal figure of 10 to 15 per cent. The tar also suffered some cracking which resulted in a relatively high yield of light oil and gas, as judged by strictly low-temperature standards.

The Barnsley process was devised primarily to make a smokeless solid fuel for domestic purposes, and it accomplishes this purpose. The cylinders of coke as discharged from the retort fracture into triangular sections about 3 inches long. The coke is hard and compact and less than 5 per cent passes a ½-inch screen. It ignites readily and gives a cheerful glowing fire. In other words, it is an excellent smokeless fuel.

I have referred to this process in some detail because it represents conditions that will produce suitable smokeless lump fuel, a high B.t.u. gas, an equal quantity of light oil and double the quantity of tar as compared to the high-temperature process. The disadvantages are (1) high cost of operation in charging and discharging so many small test-tube-like retorts, and (2) doubtful life of the cast iron at the temperature employed. Any warping of the metal will increase the difficulty of discharging the coke. Granting technical success, it is questionable whether this process can be carried on economically in competition with present high-temperature gas or coke-oven practice.

*Wallace process.*—In the United States, Wallace proposed a vertical cast iron cylinder of larger diameter than the Parker retort. In order to increase the rate of carbonization and avoid cracking the tar by the hot retort walls, he fixed in the center of the retort a perforated tube, closed at the top, through which the gases and vapors are withdrawn, thus pulling them through the cold coal away from their usual course through the hot coke and up along the retort walls. This type of retort should give high yields of primary tar. However, no commercial plant has yet been constructed.

*Rolle retort.*—In Germany, the same principle of withdrawing the gas to the unheated center has been used for years in distilling the rich brown coals for their wax and oil content. The brown coal is charged continuously at the top and descends in the 4-inch annular space between the cast iron rings, arranged in Venetian blind fashion, that form the inner cylinder and the heated firebrick that form the outer shaft. The distillation products are drawn into the interior space and out through the bottom of the oven. The brown-coal residue is a charcoal-like granular material about the size of rice. It is called "Grudekoks" and is sold as domestic fuel for use in specially constructed stoves and ranges. It is easily ignited and burns without flame with very little excess air. A heap of "Grudekok" will burn slowly to the bottom with the air that diffuses into the material. To minimize cracking of the oils the temperature in the retorts is not permitted to exceed 450 degrees C. The output is low, only four tons per retort in 24 hours, and the first cost and space occupied per ton of material carbonized is high. The use of the Rolle retort is limited to the soft, earthy, non-coking brown coals of Germany, and even there efforts are being made to develop retorts of much higher capacity which employ internal heating by hot gases.

### Horizontal Thin Layers of Coal

*Piron-Caracristi process.*—The Piron-Caracristi process adopted by the Ford Motor Company has attracted much attention. A 400-ton per day oven, about 50 feet long and 4 feet wide, was completed in 1924 at Walkerville, Ontario, contiguous to the power plant burning pulverized fuel, in which the pulverized semi-coke was to be burned. The process is as follows:[3]

The crushed coal is charged into a series of shallow cast-iron pans 36 by 18 by 1 inch deep, which are part of a continuous chain belt. The coal layer is about 5/8 inch deep. During the carbonization period the coal particles do not move in relation to each other, but are free to swell, become pasty, and fuse into a sheet of coke, which detaches itself from the pan during the return of the belt.

The heat is applied to the coal through a melted lead bath on the surface of which the pans float and are dragged along from one end of the bath to the other. The temperature of the bath is maintained by burning gas in cast-iron flues immersed in the lead, which is contained in a water-cooled clay refractories tank. As the temperature of the lead can be readily ascertained and controlled, the coal is subjected to a uniform definite temperature through the transfer of heat from lead to iron pan, thence to the thin layers of coal in the pans.

The volatile matter evolved escapes to the condensers through ducts in the wall of the distillation chamber over the lead bath, without being subject to higher temperatures than were intended.

While the quantity of coal in each pan is small, the time necessary to allow for satisfactory carbonization of the thin layer of coal is so short, less than five minutes is the claim, so that the furnace as a whole may have a large daily output.

Preliminary operation of this plant at Walkerville showed that all details of design had not been worked out satisfactorily.[4] It is a question if metallurgical science has yet developed a method of reasonable cost from which may be constructed a suitable chain mechanism that can be operated over a long period at a temperature of 650° C. It is also difficult to design a charging and discharging mechanism which will never admit excessive quantities of air into a large retort space.

## EXTERNALLY HEATED RETORTS: COAL STIRRED IN CONTACT WITH HEATED SURFACES

### Vertical Retorts

*Greene-Laucks process.*—The Greene-Laucks type of retort is described by Porter[5] as follows:

> "The Greene-Laucks process, developed first at Denver, Colorado, is now being tried out with Illinois coal screenings by a large coal mining company in that state. This process propels the coal upward on a worm conveyor in a vertical retort in which heat is applied both on the outside and within the hollow conveyor shaft. As the object in this case is to make a good solid fuel with recovery of tar oils, little attention is paid to gas yield, and 15 to 17 per cent of volatile matter is left in the coke. The retorts now operating with this process have been producing good strong semi-coke over long continued periods, at a rate of 24 tons of coal carbonized per retort per day. The fuel is readily ignited, burns smokelessly and holds the fire well.
>
> "The movement of the charge is upward and the temperature of the heating flues is graded from higher at the top to lower at the bottom. The shaft of the worm may be utilized either as an auxiliary heating flue or as an off-take for the gas and by-products. With such method of movement of coal on a conveyor, there may be but little mechanical intereference with the agglomeration of the caking mass, and, in fact, small-sized coal or screenings may build up into marketable sizes of lump coal or semi-coke."

### Horizontal Retorts. Stationary Retorts with Internal Stirrers

*McIntire retort.*—The most recent type of the externally heated, internally stirred horizontal type of retort is that designed by C. V. McIntire, and now operated on an experimental basis by the Consolidation Coal Products Co., at Fairmont, West Virginia. This retort[6] is a modification of the primary carbonization retort of the "Smith" or "Carbocoal" process installed at Clinchfield, Virginia. The original carbocoal retort was not practical because of breakage of the stirrer arms through resistance of the pasty, fused mass of coking coal, as well as other difficulties. The McIntire retort is reported to have solved this problem, and to have successfully carbonized coal from the Pittsburgh bed—a coking coal—for considerable periods at the rate of 50 tons per day. The semi-coke produced is not lumpy, but granular. It is, therefore, not suitable for domestic fuel without subsequent briquetting. However, it could possibly be pulverized for powdered-fuel furnaces.

The retort is 16¼ feet long and 8½ feet in diameter. The lower part of the retort consists of V-shaped sections of resistant iron heated by burning gas in the space below. The upper part of the cylinder is removable and made of light boiler plate covered with silo-cel. The slack coal is charged continuously into one end of the retort and discharged at the other. The charge is agitated by a central oscillating shaft 30 inches in diameter, carrying arms with paddles. The gas is conducted out of the retort at the coal charging end.

With the coal heated to a maximum temperature of 450° C. the following yields were obtained:

| YIELDS FROM McINTIRE RETORT, PER TON OF COAL CHARGED | |
|---|---|
| Semi-coke—12-14 per cent volatile matter), per cent | 75 |
| Gas (875 B.t.u. per cu. ft.) cubit feet | 3000 |
| Crude tar oils (1,080 sp. gr.), gallons | 30 |
| Ammonium sulfate, pounds | 10 |

The moving metal parts of the retort operate at a much more favorable temperature (450° C.) than the Piron-Caracristi process, yet it is a question if the maintenance cost of this mechanism may not prove too high for profitable commercial operation. Continued large scale operation is required to answer this question.

### Rotating Cylinders

*German Investigations.*—The total consumption of petroleum products (gasoline, kerosene, Diesel engine oil and lubricants) in Germany for the year 1922 was approximately 1,000,000 metric tons, but the total petroleum production of Germany for the same year was only 45,000 tons. Germany is, therefore, intensely interested in the production of petroleum substitutes from coal. German engineers have calculated that the low-temperature distillation of 34,000,000 tons of coal will provide 1,700,000 tons of low-temperature tar, which in turn will yield 1,000,000 tons of petroleum substitutes, the present yearly need of Germany. Central electric power stations, large industrial power plants and briquet works consume 63,000,000 tons of coal annually. It is, therefore, theoretically possible to provide the necessary quantity of petroleum substitutes for Germany's needs from the internal coal resources by extracting the tar oils from this coal before it is consumed for generation of power. I found German engineers keenly interested in this possibility, especially in connection with the burning of the low-temperature coke in pulverized form; indeed, this appears to me to be one of the logical future fields for low-temperature distillation.

Franz Fischer, director of the Kaiser Wilhelm Institute for Coal Research at Mülheim-Ruhr, began intensive experimentation on low-temperature distillation and the investigation of low-temperature tars early in the war period. He developed on a laboratory scale the small rotary retort which was subsequently built in full-size industrial units with various modifications of Thyssne, Fellner-Ziegler, Bamag-Meguin, and recently by the Mathias Stinnes Colliery at Essen. All of these retorts are externally heated and produce gas of high calorific value and a friable, voluminous semi-coke which can best be utilized by either briquetting with pitch or by pulverizing for powdered fuel. These installations have been in operation in an experimental way, some of them over periods of months. None of them are in continuous commercial operation at present, partly because economic conditions are not now favorable for financial return on tar-oil and partly because of technical difficulties not completely solved. As stated before, the utilization of the semi-coke as pulverized fuel in such installations is yet to be developed, and the commercial utilization of the low-temperature tar are the present goals of German research engineers.

*Thyssen retort.*—Through the courtesy of Dr. Fischer I had the opportunity of seeing a Thyssen rotary retort[7] at the August Thyssen Works near Essen. It consists of a horizontally mounted steel cylinder 2.6 meters (8½ ft.) in diameter and 23 meters (75½ ft.) long. The charge of coal is carried through the retort by spiral ribs on the inner surface of the retort. The capacity is said to be 100 tons per 24 hours. Maximum temperature inside retort is 500° C. (932° F.). Fuel consumption is 8 per cent of the coal carbonized. Judging from the samples of low-temperature coke displayed, the coals carbonized were non-coking. Fusing coals would stick on the walls of the retort, retard heat transmission and cause eventual failure of the steel by overheating.

Owing to the unusually high content of ethylene, propylene, propane and other easily condensable gases in the low-temperature gas, the Thyssen Company has installed a Linde liquefaction apparatus for the separate recovery of these constituents and the light oils.

The average gas analysis for a Ruhr non-coking coal is:

| Constituent | Per Cent |
|---|---|
| $C_3H_6$, etc. | 8 |
| $C_2H_6$, etc. | 15 |
| $CH_4$ | 34 |
| $CO_2$ (+$H_2S$) | 10 |
| $CO$ | 6 |
| $H_2$ | 12 |
| $C_n$ | 1 |
| $N_2$ | 14 |
| TOTAL | 100 |

The gross calorific value is 8,000 to 9,000 calories per cubic meter, or 910 to 1,030 B.t.u. per cubic foot.

A non-coking screened lump coal (small lumps) will pass through the retort with a fair yield of lump material in the semi-coke. A weakly coking coal comes through in a very porous, spongy mass. Strongly coking coal can not be put through the retort.

One of the big drawbacks of the rotary type retort is the dust created by the tumbling coal. Special dust separators are required to throw down the dust from the hot gases before the tar begins to condense. Even with such dust-collecting equipment the tar is likely to contain from 1 to 2 per cent of dust. A high dust content detracts seriously from the market value of low-temperature pitch, especially when used for briquets.

The retort was not operating at the time of my visit, but it was said to have been operated continuously for a period of five months and appeared to be in good condition. I think the estimate of 100 tons throughput in 24 hours was very optimistic 50 tons seems to be a more reasonable estimate.

*Fellner-Ziegler rotary retort.*—This retort was the only low-temperature carbonization plant that I saw in actual operation in Germany. At the time of my visit test runs were being made on sample shipments of non-coking gas coal from Upper Silesia. The egg and nut size screened lumps charged into the retort came out in their original form, except that they were shrunken and checked with shrinkage cracks. The semi-coke had an apparent density of about 0.7 and would serve as a smokeless fuel for stoves and house heating furnaces. This particular retort at Gelsenkirchen was said to have been operated intermittently over a period of two and one-half years. It appeared to be in good condition. The retort is heated externally. It is 2.5 meters (8ft.) in

diameter and 20 meters (65 ft.) long, mounted at 5 per cent inclination from the horizontal. It is provided with a reciprocating scraper to keep plastic coal removed from the retort surface. This scraper may function with weakly coking coal, but I doubt whether it can keep strongly coking coal removed from the shell.

The semi-coke from weakly coking coal was soft and pulverulent. It should be ideal material for pulverized fuel furnaces. The by-product recovery plant included a Linde 3-stage compressor for separation of easily condensable gases by liquefaction.

The daily output of this plant when in full operation is given by Thau[8] as follows:

CAPACITY AND YIELD OF FELLNER-ZIEGLER ROTARY RETORT

| | |
|---|---|
| Throughput, tons of run-of-mine coal | 54 |
| Semi-coke (9 to 10 per cent volatile matter), per cent | 77.04 |
| Gas, cubic feet per ton | 3,863 |
| Tar, per cent | 6.46 |
| Pitch, per cent | 0.78 |
| Gasoline, per cent | 1.58 |

*Kohlenscheidung Gesellschaft double rotary retort.*—The double-cylinder inclined rotary retort recently installed at Karnap, near Essen, by the Matthias Stinnes Colliery is an attempt to increase the throughput of a given size of rotary by utilizing the middle space of the big cylinder as a drier and preheater for the incoming charge of coal. The retort is externally heated with producer gas burned in combusion chambers adjacent to the retort. Provision is made for diluting the hot combusion gases with flue gas to provide uniform and closely regulated temperatures around the retort.

The outer retort, approximately 3 meters (10 ft.) in diameter and 25 meters (80 ft.) long, is entirely supported on the inner retort which carries the driving mechanism. This arrangement is said to be a decided structural advantage in that the large stresses and loads come on cold metal, the inner retort never exceeds a maximum temperature of 200° C. (392° F.). The steel shell of the outer retort may go up to 600° C. (1112° F.) without causing an essential injury to the retort. It is claimed that the slow pre-heating of the coal in the inner cylinder changes the nature of coking coals so that weakly coking coals can be carbonized without sticking on the walls of the retort, especially if about 10 per cent of coke breeze is added to the charge.

I observed several hundred tons of a soft, friable semi-coke on piles near the retort. It appears too low in density and too friable for a high grade smokeless fuel, although in a recent article Mr. Cantieny,[9] the manager of the company, states that there is a good demand in Karnap for this fuel for domestic purposes.

It is claimed that due to the double cylinder feature and to pumping off the evolved gases and vapors countercurrent to the flow of the coal, practically no decomposition of the tars takes place, and the tar yield is 100 per cent of the laboratory yield in contrast to the 60 per cent yield in rotary retorts in which the vapors are removed at the discharge end of the retort.

At the time of my visit the retort was shut down for changes in design after an experimental run of five months.

According to the engineers in charge, the principal unsolved problem was to increase the capacity of the unit from about 50 to 100 tons per 24 hours. It was hoped to do this by the introduction of superheated steam directly through the coal in the outer cylinder. Cantieny's recent report[10] states that this object has now been accomplished by introducing about 5 per cent of steam superheated to 400-500° C. at 0:5 atmosphere pressure into the coal in the outer retort. This steam is also said to preserve the tar from decomposition and to prevent condensation on the relatively cool wall of the inner retort. Sixty to eighty tons of coal per day are said to be the present capacity of the retort.

A weakly coking fine slack coal containing 3 per cent water, 25.0 per cent volatile matter, 14.8 per cent ash, and 5.8 per cent oxygen, yielded per ton of dry coal:

| | Per Cent |
|---|---|
| Semi-coke | 82.0 |
| Crude tar, water free | 5.05 |
| Light oil scrubbed from gas | .43 |
| Thick tar | .48 |
| Gas, cu. ft. | 2500 |

*Fusion process.*—The "Fusion" rotary retort, which is operating on a small experimental scale at Middlewich, Cheshire, England, is similar to the Thyssen retort except that the spiral ribs are omitted and a star-shaped steel tumbler is introduced within the retort to prevent sticking of plastic coal on the sides of the retort. It is possible, therefore, to use a coking coal. The product contains a high proportion of fines which must be briquetted for domestic fuel or pulverized for powdered fuel furnaces.

Wigginton[11] reports that a plant of 4 "Fusion" rotary retorts each 50 feet long and 4 feet in diameter, made by Vickers, Ltd., are being installed at the Burghlee Colliery, Loanhedd, near Edinburgh, to treat waste coal.

*Dobbelstein process.*—A new German process has been described by Thau[12] which is interesting in that it aims at making a dense coherent coke in a rotary retort.

A dense hard coke is possible only when coal is undisturbed during carbonization and a low temperature plant is most economical when the operation is continuous. In the Dobbelstein process these conditions are fulfilled and the process has been developed on a semi-commercial scale at the Bottrop Collieries of the Rheinstahl Arenstein Company near Essen. The retort is a complex horizontal cylinder, the center of which consists of a double tube like the fire tube of a Cornish boiler. The outer shell surrounding this contains at short regular intervals circular double-walled cells. Heating gases pass from the inner tube into and through the cells between which are small chambers for the coal. The whole apparatus is rotated once in 3 to 5 hours in which time the coal is completely coked. Automatic equipment for charging and discharging is provided. Power consumption is small, the only function of rotation being to facilitate charging and discharging. The tar is free from dust. The heating gases enter the cells at 550° C. and leave at 350° C. The coke resembles metallurgical coke, but has smaller cells. It contains about 10 per cent volatile matter and is smokeless.

## INTERNALLY HEATED RETORTS: COAL IN DIRECT CONTACT WITH GASES OR LIQUIDS

Internally heated retorts differ radically from the externally heated type described. These processes are

usually continuous—the coal descends in a vertical shaft through which preheated gases or vapors ascend and impart their sensible heat directly to the pieces of coal. Products of combustion, producer gas, water gas, coal gas, superheated steam or combination of these gases have all been tried. Generally speaking, this type of retort contains no moving mechanism and is usually of cheaper construction than externally heated retorts. It is not, however, adapted to strongly fusing coal on account of caking and hanging in the retort. Likewise the gas can not circulate uniformly through the mass if the pieces melt together. Screened lumps of non-coking coal or briquetted fuel is best adapted for retorts of the internally heated type.

The principal disadvantage of introducing hot combustion gases into the charge is the dilution of the distillation products. The resultant large volume of gas of low calorific value must be used at the point of production, and the light oils have too low a partial pressure to be profitably recovered by oil scrubbing the gas. Superheated steam has the advantage of a greater heat carrying capacity than non-condensable gases, but it in turn involves loss of the latent heat of the steam and extra cost of superheater, satisfactory designs of which are not yet available for the temperatures required. Nevertheless, the low first cost and the simplicity of internally heated retorts had led to many designs based on this principle, some of which are now in large-scale experimental operation.

### Coal in Screened Lumps or Briquets Directly Heated by Hot Gases Generated by Air Blown into the Retort

*Maclaurin low-temperature carbonization process.*—The Maclaurin retort is essentially a large by-product recovery gas producer in which part of the semi-coke is burned to producer gas, the sensible heat of which carbonizes the descending charge of coal. The experimental producer near Glasgow, Scotland, is of square cross-section about 45 feet high and 8 feet wide at the widest part. The air blast is introduced about 12 feet above the discharge doors through a large number of narrow ports in opposite side walls, and also by similar ports in a dividing wall which is carried across the center of the retort at the same level. The coke is cooled in the zone below the air ports by steam injected at the discharge doors; part of this steam ascends through the coke and becomes heated and partly decomposed into water gas, then passes upward and mixes with the producer gas formed in the combustion zone. The raw coal is fed from an elevated hopper through a bell into the top of a cylindrical steel tank 8 feet in diameter and 10 feet high, resting on the brick work at the top of the retort. The tank serves as a condenser for the oils and tars that drain down the side of an inner steel cylinder, which dips into the well formed by a dished flange at the bottom of the tank. From the annular space between the tank and the cylinder the gases are led off to tower coolers and scrubbers:

The capacity of the retort is about 20 tons of coal per 24 hours. The coal should not be strongly coking, otherwise the charge will stick and not descend uniformly neither will the hot gases be distributed evenly throughout the charge. The retort can be operated for complete gasification or for production of smokeless fuel the adjustments necessary are in the regulation of the air blasts and the gas outlet valves. The operating temperatures are 750° C. at the air tuyeres, 200° C. at the bottom of the steel tank on the top of the brick work, and 60 to 80° C. in the gas offtake.

The semi-coke produced is but slightly fused and of low density; it is not a high-class domestic fuel—nevertheless, the Glasgow Gas Corporation has installed a battery of five producers at Dalmarnock aggregating 100 tons of coal per gas at the gas plant for the purpose of supplying gas for heating vertical gas retorts and at the same time producing low-temperature coke for smokeless domestic fuel. They expect a yield of 22,000 to 27,000 cubic feet of gas of 240 B.t.u. per cubic foot; 12 to 17 gallons (U. S.) of dry tar oil, and 14 to 15 pounds of ammonium sulfate per short ton of coal.

Since this plant is a full size commercial installation on which reliable cost figures can be obtained, the results will be watched with great interest, especially the popularity of the smokeless fuel. It is a real question whether the public will be willing to pay a sufficiently high price for this fuel to cover the cost of manufacture. A new plant has been erected at Dalmarnock.[13]

*Hood-Odell lignite carbonizing process.*[14]—The Hood-Odell oven for carbonizing lignite is similar in principle to the Maclaurin retort, except that no by-products are recovered. The sole object is to convert brown lignite, which contains from 35 to 40 per cent of moisture, into a stable, usable solid fuel. The oven is cheaply constructed from standard refractory materials. The first cost is low and the throughput per unit is high. About 50 to 60 per cent of the carbonized material can be screened out for direct use as domestic and industrial fuel, while the remainder can be briquetted, forming a high-grade domestic fuel.

The experimental oven was 6 feet long and carbonized 16 tons per 24 hours.

### Powdered Coal Carbonized by Hot Gases

As the time of carbonizing a lump of coal by hot gases decreases with the size of the lump, it follows that pulverized coal introduced into a stream of hot gases can be carbonized very rapidly.

*McEwen-Runge process.*—Probably the most interesting event of the year from the standpoint of the power plant engineer is the announcement[15] that the International Combustion Engineering Corporation has contracted with the North American Company to construct a 210 ton per day experimetal plant for the low temperature distillation of pulverized coal at the Lakeside Plant of the Milwaukee Electric Railway & Power Company, by the McEwen-Runge process. This is a process[16] for recovering by-products from pulverized coal by an internal heating method such that the carbonized residue can be used directly as pulverized fuel without re-pulverizing. The heating is so designed that the primary gaseous products can be recovered with minimum dilution by inert heating gases, and they are said to be rich enough for distribution as town gas.

Briefly, the process is two-stage. It is carried out in two vertical cylindrical retorts, the first stage being superimposed on the second. The function of the first stage is drying and removal of some water of constitution along with $CO_2$. The heating is counter-current; hot combustion gases (700° F.) and air containing heat recovered from the carbonized residue are passed in at the base of the first retort where they meet a descending stream of pulverized coal, giving up their heat to it. On passing through the retort these gases contain but little combustible and are rejected. The hot coal falls into a bin from which it is fed mechanically into the second stage retort. The descending coal is carbonized by (a) pre-heated distillation gases; (b) products of combustion introduced into the tower, or (c) products of combustion generated within the retort by the admission of a suitable quantity of hot air. The maximum temperature here is 1500° F. (816° C.). Auxiliary apparatus includes the usual coolers and scrubbers for removal of the tar from the gas. The process is continuous—requiring 6 minutes for both stages—and units proposed will have a capacity of 210 tons per day. The proposed process goes to the ultimate extreme in rapid heat transfer to the coal and has possibilities of very high throughput in relatively low cost equipment. But the mechanical difficulties to be solved seem very great, especially in separating the fine dust from the vapors.

The pulverized fuel burning people evidently have faith in the pretreatment of pulverized coal and the recovery of by-products in connection with central power generation. It will be recalled that the Caracristi-Piron process[17] at the Ford Motor Company was designed to pretreat coal for a pulverized fuel fired power plant. This latter process seemingly struck a snag when put into operation, as nothing has been heard about it during the last year.

### Complete Gasification

In the report of the Giant Power Survey Board for Pennsylvania, issued in February, 1925, the following appears on pages 381 and 382:

"The outstanding commercial installation representative of by-product complete gasification processes is that of the Combustion Utilities Corporation, sometimes called the Doherty process A plant was put into operation at the Hazel-Atlas glass factory at Washington, Pa., in the summer of 1924, following years of experimental plants in Denver, Colorado, and Toledo, Ohio. (See Figure 22.)

"The main problem of this type of process is to overcome the binding or sticking of the charge of coking coal within the retort, which has been the major source of trouble in all gas producers attempting large production with our Eastern melting bituminous coals.

"The retort may be classed as of the vertical stack, internally heated, continuous operation, semi-combustion, gasification type, with recovery of tars and ammonia, producing large volumes of low B.t.u. gas of about 160 to 210 B.t.u. As constructed, the stack is about 100 feet high and about 26 feet outside diameter at the base.

"High volatile bituminous coal, crushed and mixed with a proportion of coke suffiicent to keep the mass from becoming too pasty at any stage of the process, is charged continuously. A controlled air blast enters a few feet above the bottom. Preheating the air blast increases the rate of formation and especially the heating value of the gas. A portion of the coked charge accompanied with ash is withdrawn at frequent intervals at the bottom. The coke is screened and washed to separate it from the ash. The coke comes out in small pieces from nut size down to small granules. The coke is used to mix with raw coal to be charged again into the retort at the top.

"The retort can be so operated that less but richer gas is obtained up to about 300 B.t u. per cubic foot, and a large proportion of coke is withdrawn, so that some becomes available for sale or use as a power plant fuel."

This plant has been in operation more or less completely during the past two years. No definite operating data have yet been published and it is not known whether a good quality of dust-free tar is obtained in regular operation. The installation includes Cottrell precipitators for cleaning the gas and Sharpless supercentrifuges for dewatering the tar.

### Coal Heated by Hot Products of Combustion Generated Outside the Retort Proper

*Seidenschnur-Pape Process.*—This process is of interest because it makes use of hot products of combustion, free from oxygen, for drying and distilling brown coal in two separate stages.

I saw an experimental plant of five to six tons capacity per 24 hours at Freiburg, Saxony, in 1924.

The raw brown coal containing 40 to 50 per cent moisture is charged into the drying chamber and then descends into the distillation chamber, where oxygen-free flue gases from the combustion chamber enter at the bottom and leave at the top at a temperature of about 100 degrees C., and then pass to the tar-recovery apparatus. From the distillation chamber part of the carbonized residue goes to a gas producer for generating the necessary fuel gas for the process; the remainder is discharged through a cooling chamber. It is used as a domestic fuel in special stoves designed to burn this fine-grained residue known as "Braunkoklenflammkoks."[18] This fuel is quite smokeless and burns with a short flame. It is said to contain from 20 to 30 per cent of tar-free combustible volatile matter.

The hot producer gas passes directly into the combustion chamber where it is burned without excess of air the necessary amount of air is supplied from the blower. The temperature of the hot gases entering the distillation chamber is further regulated by admixing a suitable amount of inert gases from the drying chamber through the blower. A suitable portion of the hot combustion gases is constantly added to the drying gas circuit in the mixing chamber.

The experimental plant that I saw was arranged for other combinations as well, including the use of superheated steam.

*Lurgi Process.*—The Lurgi Company at Frankfort, Germany, is also working on a similar scheme of circulating combustion products through a drying and a carbonizing zone. As brown coals contain about 50 per cent of moisture, much more heat is required for drying than for carbonizing the coal. The drying chamber temperature is approximately 250° C. and the carbonizing chamber about 500° C. The following results are reported on a 13-ton per day experimental unit.[19]

Material: Earthy brown coal, of 45 per cent water, 7.5 per cent ash. Net heating value, 3,000 calories, tar content according to Graefe method, 8.74 per cent.

Throughput per 24 hours—13.75 ton (metric).

Additional brown coal used in gas producers for fuel gas—13 per cent.

| | |
|---|---|
| Semi-coke yield | 29.81 per cent |
| Tar yield | 8.28 per cent |
| Light oil yield | 0.66 per cent |

CRUDE TAR ANALYSIS

| | |
|---|---|
| Specific gravity at 44°C | 0.925 |
| Setting point | 41.5°C |
| Insoluble in benzol | 0.12 per cent |
| Water content | 0.07 per cent |
| Paraffin content | 11.0 per cent |

SEMI-COKE ANALYSIS

| | |
|---|---|
| Net calorific value | 6200 calories |
| Ash | 22.5 per cent |
| Volatile matter | 15.0 per cent |

Neither of these processes is yet in commercial operation.

### Coal Heated by Sensible Heat of Hot Producer Gas Generated in Separate Producer or by Reheating and Recirculating the Low-Temperature Gas

*Laing-Nielsen "Sensible" Heat Process.*—Laing and Nielsen of England have designed a low-temperature carbonization process in which the coal is heated directly by hot producer gas, water gas, or reheated coal gas circulated through the interior of the retort.

The cylindrical steel retort is lined with firebrick and lagged on the outside with heat insulating material. The coal is charged continuously into the upper end of the inclined cylinder, and travels toward the lower end over a system of baffles designed to secure intimate contact with the hot gas that enters at the lower end of the retort. The "L & N" experimental plant[20] is at Baragh, near Barnsley, England.

The retort is about 45 feet long and 3 feet outside diameter. The distilling medium can be, (1) combustion products of producer gas, (2) straight non-combusted producer gas carrying the sensible heat of the gas reaction, (3) superheated water gas, and (4) a reheated circulating gas. The temperature of the distilling medium entering the retort is generally about 650 to 700° C., and it leaves the retort at a temperature not below 150° C. It has been found that the temperatures of the coal itself are 100 to 120° C. below these temperatures. Dust from the distillation gases is separated in cyclone dust catchers, in which no tar is said to condense. The heavy and high boiling tars are separated in two annular air-cooled condensors. But most of the oil is carried on into the water tube condensers and the boosting fan which also acts as an efficient oil separator. Leaving there the gas passes through a "P. & A." separator, a final water tube condenser, and two scrubbing towers through which wash oil can be circulated. The gas, after being freed from its liquid products, can be recirculated, or conducted to wherever it is wanted.

The following figures are based on a series of tests carried out on Barnsley bed coking small:

| Coal analysis | Per Cent | Semi-coke analysis Per Cent |
|---|---|---|
| Moisure | 4.33 | Nil |
| Volatile matter | 32.77 | 10.15 |
| Fixed carbon | 55.78 | 80.95 |
| Ash | 7.12 | 8.90 |
| | 100.00 | 100.00 |

YIELDS PER SHORT TON RAW COAL

Semi-coke—70.5 per cent.
Oil (crude)—19.3 U. S. gallons.
Gas—3,000 cu. ft. 610 B.t.u. net per cu. ft. at 60° F.

OIL

From condensers—92.6 per cent=17.8 U. S. gallons.
From gas scrubbing—7.4 per cent=1.43 U. S. gallons.

STANDARD FRACTIONATION OF CONDENSER OIL (ENGLER)

| Fraction | Per Cent by weight | Sp. gr. |
|---|---|---|
| 0 to 170°C. | 0.3 | 0.860 |
| 170 to 230°C. | 13.1 | 0.945 |
| 230 to 270°C. | 19.5 | 0.977 |
| 270 to 360°C. | 31.2 | 0.987 |
| 360 to 400°C. | 18.5 | 1.026 |
| Pitch coke | 15.2 | |
| Oil from gas scrubbers | | 0.822 |

Water in crude oil after 24 hrs. settling—3.3 to 5.5 per cent.
Tar acids in crude oil—42 per cent.
Sulphur in crude oil—0.32 per cent.
Flash point of Diesel fraction 270° to 300°—195° F.

THERMAL BALANCE

Total heat in raw coal on dry basis=291 therms.
Total heat in raw coal as received=272 therms.

| | Per Cent | | Therms |
|---|---|---|---|
| Recovered as semi-coke | 70.5 | = | 191.3 |
| Recovered as oil | 10.4 | = | 28.4 |
| Recovered as gas | 8.3 | = | 22.7 |
| Total recovered, gross | 89.2 | | 242.4 |

Heat requirements in process—

| | | Therms |
|---|---|---|
| Moisture—4.83 per cent. Heating, evaporation and superheating | = | 1.175 |
| Semi-coke—70.5 per cent. Leaving at 550° C. | = | 4.025 |
| Oil—10.4 per cent. Heat of formation, etc. | = | 0.925 |

Distillation gas.

| | |
|---|---|
| Useful heat per cu. ft. between 650° C. and 150° C.=15.85 B.t.u. per cu. ft.=0.0001585 therm. | |
| Total quantity of gas circulated=44000 cu. ft., leaving at 150° C.= | 2.080 |
| Radiation losses in retort, etc., and difference | 0.849 |
| | 9.054 |
| Total heat in 44000 cu. ft. of gas at 650° C.= | 9.054 |

This heat was provided by gasifying coke in a gas producer and burning the producer gas with secondary air. The overall efficiency of the combustion is 50 per cent. Hence therms requires as coke=

$$\frac{9.054 \times 100}{50}$$

=18.1 therms=6.64 per cent. The net heat recovery is, therefore, 242.4—18.1 therms=224.3 therms or 82.56 per cent.

### Superheated Steam Processes

At first thought it would seem that superheated steam would be the best heat transfer medium for low-temperature carbonization. It has a relatively high specific heat; it does not dilute the distillation gases; and it permits the recovery of the light oils from the gases. However, there are two very strong objections which have prevented the development of any promising process using steam alone. These are: (1) The large heat losses in the latent heat of vaporization, combined with a large and costly condensing system, and (2) the cost of superheating equipment that will resist the strong corrosive action of steam superheated to the degree necessary for carbonization.

The auxiliary use of a small quantity of steam in other processes has been of some advantage in distributing heat through the charge and in increasing ammonia yields, as, for example, in the Scotch oil-shale process.

### Coal Heated by Direct Contact with Molten Lead[21]

Several patents have been issued for heating crushed coal in direct contact with molten lead, whereby carbonization is completed in a few minutes. However, the unavoidable loss of lead makes these process too expensive for practical consideration.

### Two-Stage Processes in Which Coal Is Preheated Before Carbonization

Several processes for the low temperature carbonization of coking coals have been proposed, in which the

coal is preheated to a temperature below the plastic temperature before charging the material into the carbonizing retort proper. Such pretreatment, especially when done in the presence of some oxygen, destroys to a large extent the coking properties of the coal, so that it does not stick to the walls or clog the retort. Usually the first stage of heating is done in a rotary or stirred retort, but the preheating may also be done in an internally heated vertical shaft retort. According to A. R. Powell[22] the advantages claimed for preheating are the following:

"1. The coal is dried before charging. Before the coal carbonizes in the retort it is necessarily dried by the oven heat, but the thermal efficiency and capacity of a drier where the coal may be kept in motion in a steel chamber before putting into the oven is much higher than the oven itself would be.

"2. Sensible heat is introduced into the coal before charging. For the same reason as above, the coal temperature is raised to just below the fusion point of the coal much more efficiently in a preheater than it would be in the oven.

"3. The amounts of various coal components are said to be changed by the preheating so as to favor the production of good coke.

"4. The preheating is said to produce conditions favoring autogenous carbonization by exothermic reactions."

The two best examples fo two-stage processes are the Parr process and the Illingworth process. Powell[23] describes these processes as follows:

*Parr Process.*—The process of low-temperature distillation devised by Parr and Layng in America has been one of gradual evolution. At the present time the retort used is a vertical cylinder externally heated, and possesses no novel mechanical features. The method claimed for heat transfer is different from those which have been described under the preceding headings. The claim is made that certain classes of coal, particularly Illinois or other high-oxygen coals, will give out heat during carbonization, and this heat will be sufficient, provided the coal has been preheated to a certain extent, to carbonize the coal autogenously. In other words, the preheated coal can be charged into the retort, and then just sufficient temperature is kept at the outside of the retort to start the exothermic coking reaction in the outer layer. The claim is made that this exothermic reaction will then pass comparatively rapidly to the center of the retort, and coking will be completed without a physical transfer of heat units from the outer wall to the interior.[24]

*Illingworth Process.*—The Illingworth process is essentially one of pretreatment in order to improve the coking quality of coal. The pretreatment consists in preheating the coal in an inert atmosphere so as to secure a selective decomposition of certain constituents, which, if allowed to remain, have a bad effect on the quality of coke produced.

## Comparisons of Various Systems

It is evident from a consideration of the many different processes that have been and are being tried experimentally that no outstanding single method has yet met with unqualified technical success. Each has its peculiar problems yet to be solved, and a number have shown promise under certain favorable conditions. The processes that depend on internal heating are simpler and require less capital expenditure per ton of coal carbonized, but they are limited to non-coking, weakly coking coals, or briquetted coals also the gas is of low calorific value and the light oils are not recoverable from the diluted gas. However, such processes are promising for future development in combination with large central station power plants or industries using large quantities of gas of low heating value, at such future time when diminishing petroleum supplies create a demand for low temperature fuel oils.

The relatively higher cost processes using externally heated retorts will probably find their most advantageous field in making relatively high-priced smokeless domestic fuel from a cheap non-coking or poorly coking coal in connection with a market for high B.t.u. gas. These processes also yield several gallons of light oil that is not to be had from internally heated processes. Local economic conditions and the type of coal available are important factors governing the selection of the most suitable process.

## Products of Low-Temperature Carbonization

The quantity and quality of the carbonization products of coal depend upon the type of coal used and the heat treatment it receives in the process. High-temperature processes produce hard cellular coke and crack the primary tars into fixed gases, aromatic light oils and viscous tars containing phenols, cresols, anthracene, naphthalene, and other aromatic compounds. Low-temperature processes produce softer semi-coke, which retains 7 to 15 per cent of volatile matter and also produce uncracked and but slightly decomposed primary tars and oils containing paraffins, naphthenes, cresols, xylenols and higher phenols. The gas volume obtained is only one-fourth to one-third that obtained in high-temperature coking, but has almost twice the calorific value per cubic feet. The quantity of light oil suitable for motor fuel is about the same from both processes; the composition, however, is quite different. The low-temperature product contains saturated and unsaturated paraffins, hydrocarbons, naphthenes and complex aromatic hydrocarbons while the high-temperature process yields benzol, toluol and xylol.

The total low-temperature tar yield is about twice that obtained at high temperature, but the ammonia yield is only one-third to one-half as much.

These comparisons apply to externally heated retorts. Internal heating dilutes the light oil vapors to a point where recovery is impracticable by present methods and produces large volumes of gas of low calorific value.

Table 3 gives approximate yields of high temperature and the two main types of low-temperature processes—namely, externally and internally heated retorts.

TABLE 3—APPROXIMATE COMPARATIVE YIELDS OF HIGH AND LOW-TEMPERATURE CARBONIZATION PROCESSES

| | High-temperature carbonization | Low-temperature carbonization | |
|---|---|---|---|
| | By-product coke-oven | Externally heated retort | Internally heated retort |
| Coke, per cent | 60- 70 | 70- 80 | 60- 75 |
| Volatile matter in coke, per cent | 1- 2 | 7- 15 | 7- 15 |
| Gas, cu. ft., ton | 11000-12000 | 3000-5000 | 20000-50000 |
| Calorific value of gas, B.t.u., cu. ft. | 520- 580 | 800-1000 | 150- 250 |
| Tar, gallons | 10- 12 | 20- 30 | 18- 20 |
| Specific gravity of tar | 1.19 | 1.07- 1.09 | 1.02- 1.07 |
| Light Oil for motor fuel, gal. | 2.5- 3.0 | 2.5- 3.0 | None |
| Ammonium sulfate, lbs. | 25- 30 | 10- 12 | 12- 18 |

An analysis of these yields shows that the only increased by-product return is the 15 gallons more of tar-oil per ton of coal carbonized over that now being recovered in standard by-product ovens. As the price of this tar is determined by the prevailing price of fuel oil, that is, about 5 cents per gallon—the additional credit is only 75 cents per ton of coal. Against this credit must be charged a lower ammonia return of approximately 35 cents per ton of coal and a lower yield of gas. Obviously the by-products of low-temperature carbonization do not, today, afford a much greater financial return, than existing methods of high-temperature carbonization.

### Immediate Future of Low-Temperature Carbonization Processes

Where, then, is the possibility of profitably engaging in the low-temperature carbonization of coal in America under present economic conditions? This is a very difficult question to answer. Fuel technologists experienced in gas and coke manufacture are as a rule very skeptical of any low-temperature process being commercially successful in the near future. They point out that the principal product of these processes is semi-coke. Therefore, this product must find an adequate market at a sufficient price to make the process profitable in competition with gas and by-product oven coke. It is not likely that any greater price can be secured than the prevailing price of high-temperature coke sold for domestic purposes. Furthermore, this low-temperature coke is too friable and porous from many of the proposed processes to be directly used as a domestic fuel. It must first be briquetted and this operation adds further cost to the product.

In reply to these objections, it is admitted that the commercial success of low-temperature carbonization of coal in the near future must depend mainly on the sale at an adequate price of the solid product—smokeless fuel—rather than on the liquid and gaseous by-products. The by-products are important contributing factors, but they cannot carry the entire cost of processing the coal under present competitive prices of petroleum fuels.

However, it does not follow that low-temperature carbonization cannot be developed to make a high-priced fuel from low-priced non-coking coals. There is relatively little coking coal in the Central and Western states. These non-coking coals are not suitable for by-product coke ovens. Processing these coals affords a fairly large margin between cost and selling price of the processed fuel, so that it seems possible to work out a low-temperature process which can compete with high-temperature processes, requiring more expensive raw material in supplying the smokeless fuel requirements of this region.

### Ideal Future System of Coal Carbonization

In conclusion, I wish to emphasize the fact that the low-temperature carbonization of coal furnishes little, if any, greater yield of gasoline substitutes than existing high-temperature processes. Low-temperature tar is essentially a fuel oil substitute. Increased gasoline yields require hydrogenation and cracking of these tars, or reduction of the phenols. A more promising method for producing fuels of low boiling point is by direct synthesis from carbon monoxide and hydrogen.

Some time in the near future, when petroleum becomes scarce, an ideal combination process of carbonization may be developed which will provide the necessary oil and gasoline substitutes. In this ideal process the full yield of primary oils will be extracted from the coal by carbonizing at gradually increasing temperatures to remove all the volatile matter from the coke. Coke will then be converted by way of the water gas reaction to carbon monoxide and hydrogen, which, when heated under high pressures (100 to 200 atmospheres) in steel autoclaves in the presence of suitable catalysts, may be converted into alcohols suitable for motor fuel. Dr. Fischer, of the Institute for Coal Research at Mülheim-Ruhr, has succeeded in making such a mixture of alcohols varying from methanol to an alcohol containing 9 carbon atoms. This mixture, which he terms "synthol," was made at 150 atmospheres pressure, and 400° C. The catalyst was iron oxide impregnated with alkali. This fuel gave satisfactory performance in a motorcycle engine. Methanol is now made in Germany by a similar process in copper-lined autoclaves, using zinc oxide catalyst, at a manufacturing cost of 18 cents a gallon.

The Bergius process for conversion of coal into oil recently developed in Germany, also offers great possi-

(Continued on Page 18)

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# ATHLETICS

Losing the first two games of the season to Regis College and Denver University respectively, the Orediggers started on a rampage by walloping the Ministers 5 to 4 in a return battle and downing the Colorado College Tigers 10-9 in the next tilt. The Bengals trimmed the Miners 13-9 the following day. The losing streak continued and Boulder annexed a 22-5 victory at Boulder and Aggies swamped us 9 to 2 before the Dynamiters made a comeback and handed the Farmers a 12-7 defeat. The return Colorado University game resulted in a 9 to 9 tie and in the play off, the Miners were defeated 7 to 6. Another game was dropped to the Greeley Teachers and Regis College romped home with their second victory of the season before the season was over.

An infield composed of green men steadied by the veteran Sotock at second, is our hope for next year. Simmons at short, Jenkins at third, and "Red" Wells at first ought to have regular berths in 1927. Sotock will be back again to give the Miners a veteran infield. Volk is the only player lost and Courtright expects to find a right fielder to replace him. Look and Rice will be back. Del Rio, who performed like an iron man on the mound, will do most of the hurling in 1927 and Gallagher, re-elected captain, will be behind the plate again.

The first two games were reported in April. The following are reviewed briefly.

Mines 5, Denver University 4

Del Rio slammed out a homer with Gallagher on base to win his own game from Denver University, April 20. Del was given good support by his mates and allowed but 9 blows. It was a conference upset as the Pioneers had previously whipped the Orediggers 12 to 2. Denver is slated to win the championship.

---

Mines 10, Colorado College 9

Gathering 5 runs in the first, three of them due to Simmons' timely triple, the Miners took a lead from the Tigers that was too much for the Springs aggregation. Faller was given his first mound duty and weakened in the seventh when 6 runs were scored off his delivery. Del Rio went to the rescue and held the Colorado men scoreless while Sotock stole home with the winning run for Mines.

---

Colorado College 13, Mines 9

Batting Del Rio out of the box in four innings, the Tigers defeated the Miners in the second of the two game series at Golden. The Orediggers scored 5 times in the seventh and eighth but the handicap was too big. O'Connor hurt his ankle in this game and was lost to the team for the rest of the year.

Boulder 22, Mines 5

The less said the better. Colorado University ran wild on the bases and had the Miners helpless throughout this nine inning tilt and both sides were glad when the game was over. Del Rio, Much and Bladholm were on the mound for short periods but all looked alike to the University clan.

---

Aggies 9, Mines 2

A losing streak is hard to shake and Colorado Aggies won the next game of the season at Fort Collins. Look's heavy hitting was the outstanding feature for the Blue and White. Faller hurled the full nine innings.

---

Mines 12, Aggies 7

Ament, leading conference hurler, was batted out of the box by the Orediggers in the next Mines-Aggies tilt, and the jinx was evidently discarded at last. Del Rio went the route and pitched good ball. Courtright's infield combination looked good.

---

Mines 9, Colorado University 9

Fresh from the massacre of the Dynamiters two weeks before, Colorado U. came to Golden to clean up but went back with a lucky 9 to 9 tie. Frank Look, in cleanup position, pasted out 5 hits in 6 tries, failing in his last time at bat in the tenth with the winning run on third. Mines scored six runs in the eighth and ninth to tie the score. Boulder used three hurlers while Del Rio pitched ten innings for Mines.

---

Colorado Teachers 11, Mines 1

With Piper in perfect form, Colorado Teachers defeated Mines 11 to 1 at Greeley. Piper fanned 20 men, a conference record. The former record was held by Dick of Aggies who fanned 19 Miners in 1923 at Fort Collins. Rice was the leading batter for Mines with 2 hits in four tries. His triple was responsible for our only tally.

---

Colorado University 7, Mines 6

The last game of the season was lost to Colorado University, 7 to 6, at Golden. It was a playoff of the 9-9 tie. The Orediggers looked like winners in the opening innings but Del Rio weakened and his support went with him and Boulder crossed the plate with the deciding tally in the ninth. Mines had men on base in the final stanza, but Colorado's relief hurlers were supreme and the Dynamiters went out. Del Rio pitched the entire contest. The season ended with three victories and six defeats. In addition, Regis defeated the Miners twice in non-conference games.

# PERSONAL NOTES

*George M. Post, '94,* has changed his address to 609 North 6th St., Albuquerque, New Mexico.

*J. M. Kleff, '05,* recently elected association president, was in Golden early in the month, visiting the alumni office and getting acquainted with the new school.

*John Carman, '10,* was a recent visitor at the alumni office. He is manager of the Molybdenum Corp. of America properties at Questa, New Mexico. He reports that *K. B. Geib, '11,* is mine superintendent and *Jake Schroder,* ex-Mines, is mill superintendent. Carman was in Denver on a business trip and ran out to Golden to see what was going on.

*Frank Briber, '14,* informs the office that he is now in the employ of the Stearns Roger Mfg. Co., 1720 California St., Denver, Colo.

*Kenneth S. Ferguson, '17,* is with the Midwest Exploration Co., at Coleman, Texas.

*Blair Burwell, Jr., '19,* returned from Mexico City May 20th and is now located in Denver temporarily.

*Prentice F. Brown, '20,* of Fisher & Lowrie, geologists, recently returned from a geological expedition to South America and is located with the firm in Denver.

*David L. Jones, '22,* is now a salesman for the Kardex-Rand Sales Corp. with offices at 1712 Welton St., Denver, Colo. His home address is 641 South Emerson St., Denver.

*Ralph Maxwell, '23,* is a chemist with Compania Minera de Penoles, S. A. at Torreon, Coah., Mexico.

*Dr. Wilfred W. Scott, '22,* professor of analytical chemistry at the University of Southern California, was one of the speakers at the annual banquet of the Alumni Association of the College of Pharmacy, U. S. C., on May 14.

*Russell B. Paul, '97,* has been named manager of the mines of the New Jersey Zinc Co., with offices in New York City.

*John H. Wilson, '23,* has accepted a position with the Pan-American Petroleum Co., as a member of the geological staff. He has recruited a party of young Mines geologists to assist in geological surveying in Venezuela.

*Lute J. Parkinson, '23,* who has been in the Belgian Congo for the past three years, is on a visit to this country and was a recent Golden visitor. He leaves for Africa in October.

*Frank Sistermans, '23,* is a shift boss with El Potosi Mining Co. at Chihuahua, Mexico.

*Frank T. A. Smith, '16,* takes the time to write the office that "The new magazine is excellent and well worth while. Your difficulties are understood by many of us and your services appreciated." He is located in Hamilton, Nevada, for the summer.

*John Denny, '23,* recently visited at Golden on his way to Washington, D. C. His Washington address is 3475 14th St., N. W.

*M. H. Smirnoff, '24,* is connected with the Roxana Petroleum Corp., 1st National Bank Bldg., Houston, Texas.

*John L. Hutton, '25,* may be addressed at 331 Duane St., Schenectady, New York.

---

Mail has been returned to graduates addressed as follows. By the time this appears in print, we may have correct addresses for some of these listed, but if any reader can help us in solving this never-ending problem, by sending in correct addresses we will be deeply appreciative.

John M. Adamson, H. & H. Smelting & Refining Company, Blackhawk, Colorado.

William M. Lewis, 612 Franklin Trust Building, Philadelphia, Pennsylvania.

Thomas E. Gray, Care Miss Sarah M. Jones, 1003 Street, Sacramento, California.

Harry Lowenstein, Fort Lauderdale, Florida.

William B. Patrick, R. F. D., Englewood, Colorado.

Arthur D. Swift, Ingersoll-Rand Company, Tampa Florida.

Charles N. Whitaker, Reno, Nevada.

Carl F. Beilharz, Care Pure Oil Company, Tulsa, Oklahoma.

Elmer D. Shirck, Youngstown Sheet & Tube Company, Youngstown, Ohio.

Jones, Ernest F., E. M. 1910, Crested Butte, Colo.

Baker, Erwin F., E. M. 1914, Mgr. Saunders System of Kansas City, 113 East Oak Street, Fort Collins, Colo.

Keating, Paul H., E. M. 1921, Chief Engr., Sunnyside Mining and Milling Company, Silverton, Colorado.

Davis, John S. Neal, Jr., R. M. 1920, Underground Surveyor, St. Joseph Lead Company, Rivermines, Mo.

Davis, Ninetta Allia, E. M. 1920, Office Geologist Union Oil Company of California, Fort Collins, Colo.

Filteau, C. A., E. M. 1907, Cobalt, Ontario, Canada.

Hurley, Keith Patrick, E. M. 1922, Asst. in Machinery Dept., Mine and Smelter Supply Company, Denver, Colorado.

Kay, Fred Dickworth, E. M. 1921, Engr. in Mine Service Dept., Du Pont Company, Detroit, Michigan.

Gregg, Donald Cameron, E. M. 1922, Engr., Nevada Consolidated Copper Company, Box 635, Ruth, Nevada.

Curzon, Eugene Charles, E. M., 1923, Engr., 524 Grant Building, Los Angeles, California.

Gregory, Joseph Nalle, E. M. 1923, Geology, Gulf Production Company, P. O. Drawer C, Houston, Texas.

Herron, John Cuthbert, E. M. 1923, Salesman, Colonial Steel Company, 5-253 General Motors Bldg., Detroit, Michigan.

Hohloff, William Theodore, E. M. 1925, Edgewater, Colorado.

## LOW TEMPERATURE CARBONIZATION†

(Continued from Page 15.)

bilities for the treatment of western bituminous and subbituminous coal. In this process, as operated at Mannheim, pulverized coal mixed with oil or tar to form a thick paste, is heated at 400-450° in a steel autoclave under a pressure of 150-200 atmospheres of hydrogen. Under these conditions the coal is converted into a black tarry liquid which, on distillation up to 300° C. yields oils and tar to the extent of 30 to 60 per cent of the weight of the coal. The by-products are ammonia and gas.

Bergius[25] gives the following yields for 1 ton of a bituminous coal of 6 per cent ash:

| | |
|---|---|
| Motor fuel | 42 gallons |
| Diesel engine oil | 56 gallons |
| Lubricating oil | 17 gallons |
| Fuel oil | 22 gallons |
| Total | 137 gallons |
| Gas | 10,000 cu. ft. |
| Ammonia ($NH_3$) | 10 lbs. |
| Coke residue | 500 lbs. |

This process can most certainly provide us in the future with ample quantities of substitutes for present day petroleum products. There are ample reserves of coal for many years. The time when such a process can be economically worked depends on the exhaustion of our present abundant supply of petroleum. No one can predict the date. It may come before we expect it.

## CHANGE OF ADDRESS

My new address is..... Position .....

My old address was..... Position .....

Name .....Class .....

Remarks: .....

.....

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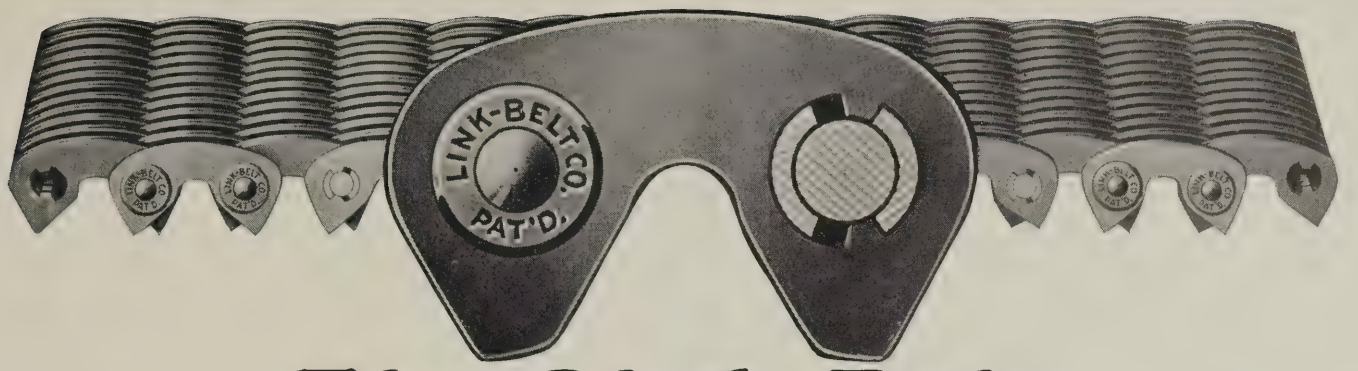
(Cut this out and send it in to Box 98, Golden, Colorado)

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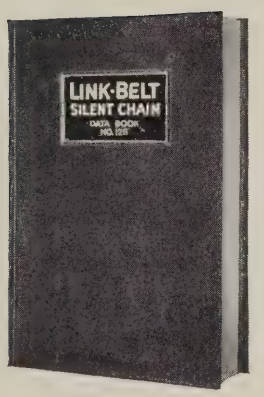


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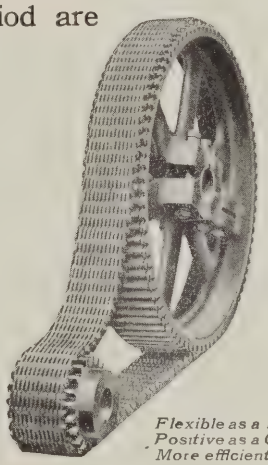

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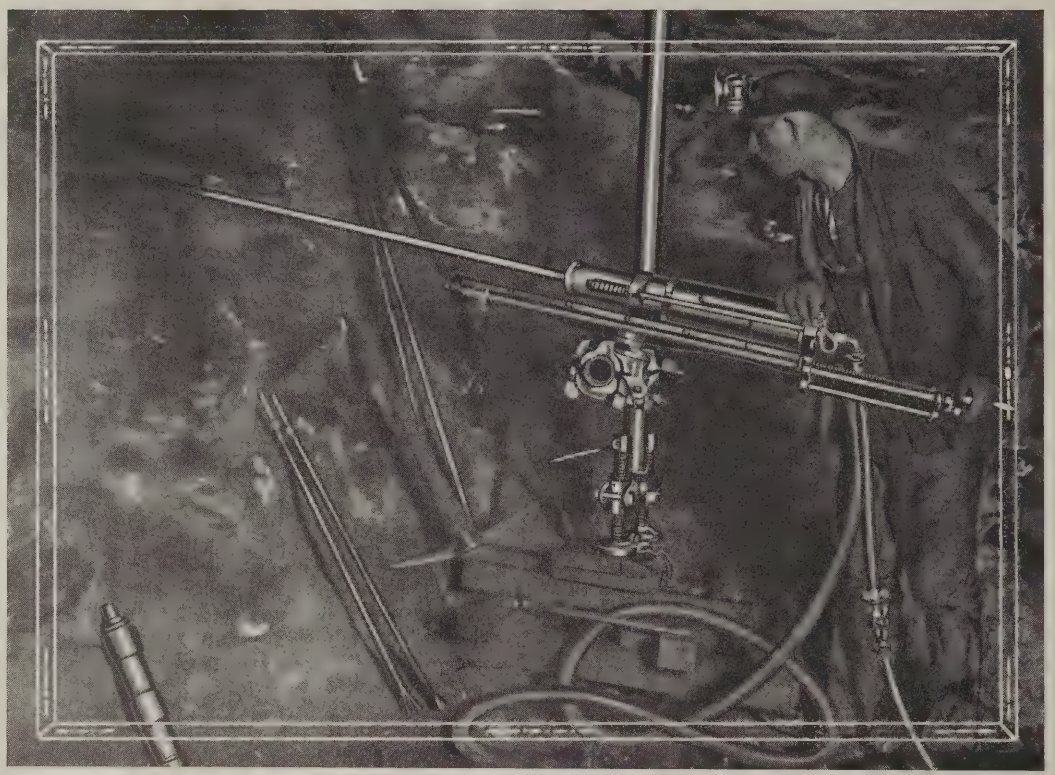

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JUNE - 1926
VOL. 16 - No. 2

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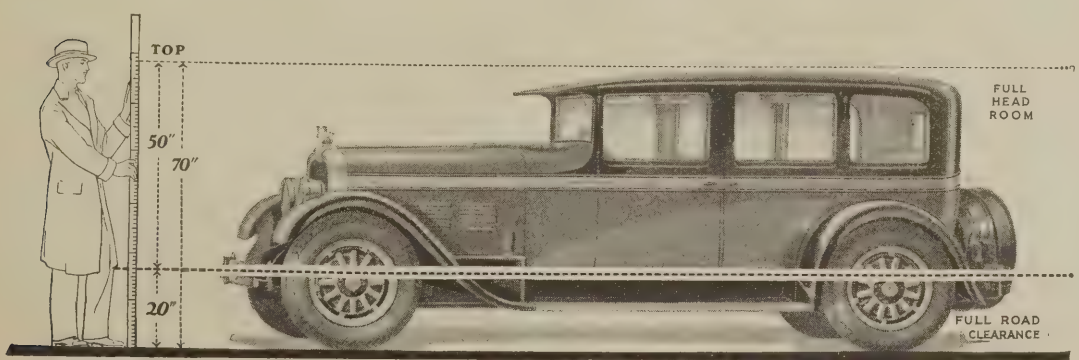

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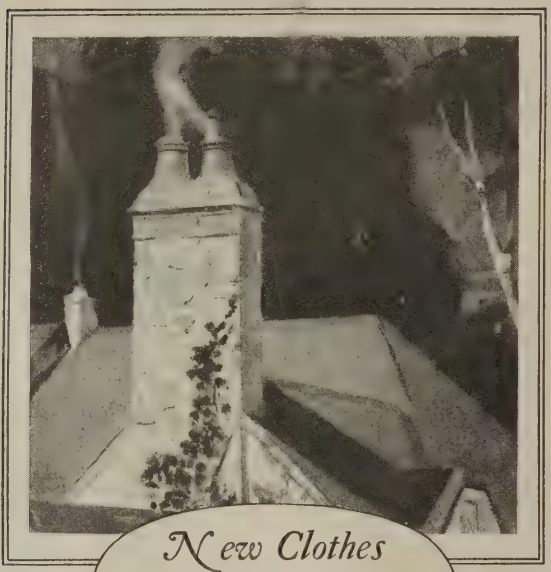

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The

# COLORADO SCHOOL OF MINES MAGAZINE

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M. R. (MONTY) BUDD, '24, Editor

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VOLUME XIV — JUNE, 1926 — NUMBER 2

# CONTENTS



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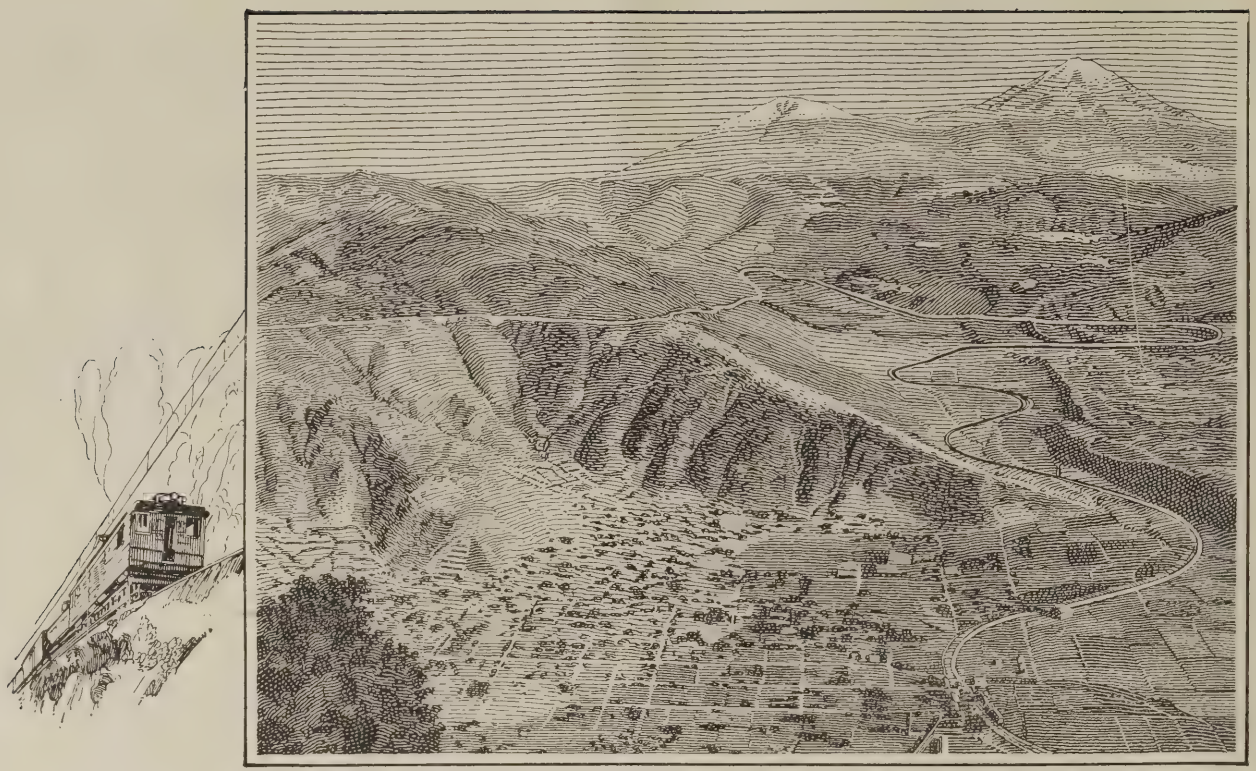

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The
# COLORADO SCHOOL OF MINES MAGAZINE

VOLUME XVI JUNE, 1926 NUMBER 2

# Editorial

## THE DIVINE RIGHT OF ALUMNI

(From the Lehigh Bulletin)

THE test of good humor is the ability to take a joke on oneself with equanimity and enjoyment. The article reprinted in this issue by courtesy of The Independent is a really good joke on all folks engaged in alumni work. We naturally emphasize to the extreme the importance of the alumni. We are constantly telling the trustees, the faculty, the undergraduates and the alumni themselves, how wonderful the alumni body is. So when an occasional alumnus becomes inflated by his own importance and starts in to try and run the college the source of the "hot air" that caused his inflation is generally the alumni office.

The article alluded to above is chuck-full of real truth and there is no alumni secretary but must admit he can name "page and paragraph" in his own alumni records where a specific instance can be found to fit every one of the author's cases or generalities. You would not believe that human beings lived so devoid of perspective as to be able to say to a college, "If you don't do as I want you to I will cancel my endowment subscription." You would think that the very asininity of it would prevent any man from saying, "Just as soon as you do things my way I will support the college, but not before," yet these things actually are said by alumni of every college. The fact that a man is a thousand miles away from the campus and has not seen the old place for twenty years does not stop him for a minute from outlining minutely just "the medicine the patient needs." Yea, verily, and he is mad as the devil if the old fogy of a college won't swallow the dose at once and immediately declare that it feels much better. Of course, the fact that a college with ten thousand graduates would have to travel ten thousand widely varying paths if it were to attempt to use the road maps favored by each alumnus never occurs to this chap with the distorted perspective. He just says, "I am running a highly successful brick-yard and if they will just model the old college on my patterns they will turn out as good graduates as I turn out brick." Yet, if the college president or any of the professors would try to tell him how to run his business he would be more than mildly scornful of such inexperienced opinions.

The truth is the business of education is as complicated as any other business and as highly specialized as any industry. The layman can't run it any more than he can any other business with which he is unacquainted. Alumni often can make illuminating suggestions and point out faults which need correction but they must study the educational game in general and their own college in particular very intensively before they can hope to give sound advice.

Generally speaking, running a college is like running any other business. You need a darned good manager who knows said business from the ground up. Having found such a man you give him freedom of action and every support posible. The one thing you don't do, if you have any business acumen at all, is to hamper him by insisting that he change his ideas and methods to conform to any chance notion that you or any other stockholder may have.

However, one thing always remains true—it is a lot better to have an alumnus who is sufficiently interested to make a kick than one who never complains because he doesn't care anything about the place. Personally I always welcome kicks. When I receive one I know that I have probably found another man who will do some work for Lehigh.

---

## SENIOR DAY BANNED

SENIOR Day has come and gone—forever.

Following unbecoming conduct of several men of the lower classes, President Coolbaugh found it necessary to take the holiday from the calendar in the future. The seniors conducted themselves splendidly. It was the younger men who took advantage of the holiday to cavort as they pleased—in a manner unbecoming to Mines men.

It means the passing of a tradition in one sense, but it means an incoming new era in another sense. Senior Day, to be frank, has never been satisfactory at Mines. Always there have been one or two insolated instances of improper conduct, not necessarily the fault of seniors—but the fault of the occasion. By removing the cause, the situation is clarified. Senior Day will never die at Golden. But Senior Day as we have known it in the past, is dead. An effective substitute, one that gives only seniors the privileges of a holiday, can easily be found. In our opinion, it will be better for the school than the banned spectacle.

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## THE CAUSE—AND REMEDY

ATHLETICS at Mines in the past seven years have not been successful. Why? That is what alumni tried to find out at the annual meeting and banquet last month. They did discover a few things about the situation that should aid the solution of the problem in the future. One is that alumni are not actively soliciting for material for their Alma Mater. Another is that there is no organization to get the coveted material. The other phases, such as coaching, equipment and similar items are of a more of less technical nature in which we are all interested, but are of such a nature that we are not in a position to aid directly. First, get the material and see what the coach can do with it. It is true that good material has not been properly handled here, but Courtright cannot be charged with that offense. Give him the men and let him alone; but first give him the men. After he has had them a few seasons, judge his worth. But get the men.

# J. M. Kleff '06 Elected President of Alumni

*Van Wagenen '05, Vice President; Clark '01, Secretary; Page '15, Treasurer, and Malmstrom '00 on Executive Committee; 76 Attend Annual Meeting and Banquet*

J. M. KLEFF, '06, of Leadville, one of the most prominent graduates of the school, was elected president of the Association of Alumni of the Colorado School of Mines, it was announced at the annual meeting and banquet of the Association at the Albany Hotel, Denver, May 22. Hugh R. Van Wagenen '06, classmate of Kleff's, now a resident of Los Angeles, Calif., was named vice-president; George B. Clark, '01, of Denver, was elected secretary; Walter C. Page '15, of Salt Lake City, is the new treasurer, and C. C. Malmstrom '00, of Denver, is the new member of the executive committee.

Seventy-six persons, including several members of the faculty and honor guests, were present at the banquet. From a standpoint of discussion and live proceedings, the meeting was one of the most successful ever held in recent years by the alumni.

Frank Reinhard '05, president of the Association, called the meeting to order and named Axel Anderson '04, Woolf '14, and Denning '26, a committee to count the ballots. In the absence of Secretary Daman and Treasurer Mathews, Monty Budd '24, assistant secretary and treasurer, read the reports of the secretary and treasurer, which were accepted.

Prof. William J. Hazard '97, of Colorado University, read the report of the committee on instruction which was warmly received. There was no discussion on the report, which is printed in full in this issue. Comment is invited.

### Honor Guests Speak

President Coolbaugh was then introduced and talked freely on school conditions. The problem of getting new students is common, he stated, and urged all to aid the school by selecting promising young men for Mines. He was enthusiastically received.

Dr. Smiley, president of the board of trustees, obliged with a clever talk that was enlightening to all.

Dean Milo Ketchum, of the University of Illinois, speaker at Commencement day, was introduced by Max Ball '06. His analysis of the great field of research of the state which should be done by Mines was keenly appreciated by the alumni. His address was short and to the point; very much of an educational talk.

One of the features of the evening was the calling of the roll by classes. As usual, the first class was 1893 and "Billy" Milliken, who claims to be the "oldest living graduate" was dumbfounded when Garvin of the same class answered roll call at the same time. W. H. Paul answered for '96; Hazard for '97; Steinhauer and Grant for '99; Steele for '00; Johnson and Clark for '01; Moss for '02; Trumbull and Anderson for '04; Rath, O'Byrne, Reinhard and Hewitt for '05; Ball for '06. Then came a lull until Dyrenforth '12, acknowledged for his class. Warren and Oram were there for '13; Woolf for '14; Blaurock, Briber and Minister for '16; Van Burgh for '17; Dudgeon for '18; Linn for '20; Norris for '21; Bond for '22; Budd for '24. After '24 came '26 with over twenty men present. The above list far from perfect because the reporter was unable to hear many of the mumbles, supposed to be names, as reeled off by each man as he arose.

An animated discussion on athletics then took the place by storm; the debate is reported under another heading. An effort will be made to organize a Denver section of the Association, it was agreed after some discussion, including a splendid talk by Junius Johnson '01, past president, who believes the time is now ripe for such a luncheon club.

The meeting adjourned at 11:30 P. M.

## Dr. Patton Given Appointment

AN announcement of unusual interest to alumni and technical men of the Rocky Mountain region, is the appointment of Horace Bushnell Patton, former professor of Geology, to the post of professor emeritus of geology. Dr. Patton, who was in charge of the geology department of the Colorado School of Mines for more than 25 years, and whose study of the geology of this region has brought him unusual recognition among geologists, is considered one of the most brilliant instructors this school has ever had. His lovable personality will be remembered by hundreds of alumni and friends.

Dr. Patton will have no administrative duties but it is believed that he will wield a powerful influence with the students of geology in the institution. His appointment is a recognition of his work for the Colorado School of Mines and it is an appointment that will be favorably received by all those interested in the school, especially those who were fortunate enough to receive their geological instruction from him.

# Seventy-one Receive Degrees

*Dean Ketchum Makes Commencement Address at 52nd Annual Exercises On May 21 at Guggenheim Hall; 800 Attend*

SEVENTY-ONE students of the Colorado School of Mines received their degrees at the 52nd annual commencement exercises May 21st at Guggenheim Hall. The big hall was not large enough to accomodate the huge crowd and many people were turned away at the door. It is estimated that 800 people were present for the ceremonies. The degree of Doctor of Science was conferred on Dean Milo Ketchum, the speaker of the day.

Governor Clarence Morley was present, as was Colonel K. C. Mastellar, chief of staff of the 103rd division of the U. S. army reserve corps, who awarded commissions to the R. O. T. C. students who were graduated. Included in the graduating class were men from every part of the United States, from China, Philippine Islands, Russia, Alaska, South America and Mexico.

The speaker of the day was Milo Smith Ketchum, dean of the college of engineering of the University of Illinois. In addressing the graduates, Dean Ketchum said in part:

"The science of engineering is based on pure and applied science and is comparably young. The art of engineering, however, is very old. The great Chinese engineer, Yu, successfully regulated rivers with dikes 4,000 years ago. The great pyramid was built in Egypt 4,000 years ago. The magnitude of this structure will be appreciated when you know that its base covers an area of 13.4 acres and that it has a height of 480 feet.

"It has been stated by Herodotus that it required 100,000 men, working twenty years, to build the great structure.

"Compare the strides engineering progress has made. It is estimated now that an average steamship in crossing the Atlantic ocean will generate more power than was produced by those 100,000 men working twenty years.

"In the beginning of the engineering schools, the curriculum consisted of languages, mathematics, chemistry and physics, together with surveying and brief courses in engineering construction. Teachers were, for the most part, men with little engineering experience. But gradually this changed from a poor liberal art course to the present high efficiency standard.

"Engineering research is now being carried on by educational institutions, individual manufacturers, associations of manufacturers, commercial laboratories, government laboratories and by scientific societies.

"The functions of the modern engineering college are three-fold. The first is the undergraduate course; the second, graduates in engineering, where men are trained to be teachers or for higher work; and, third, carrying on research investigations and training men as research experts. Engineering now is a grofession of progress and engineering research is the foundation of engineering progress."

Prizes were awarded as follows:

The Doerr Prize: Officer's model regulation sabre, awarded annually by Phil Doerr, of the School of Mines, to the leading battalion commander. It is awarded this year to Cadet Major Neil H. Wills.

The Underhill Prize: A cash prize of $25 awarded annually by Dr. James Underhill, of the School of Mines, to the cadet officer of the R. O. T. C., who displays the greatest military efficiency in his grade. Awarded this year to Arch A. Sproul.

The Band Prize: A cash prize of $25.is awarded annually by Prof. A. E. Bellis, director of the C. S. M. band, for faithful and meritorious work in the band. This is awarded this year to a man who in four years has been absent from rehearsal or performance but once. Awarded this year to George W. Thomas.

A Special Prize: Awarded this year by E. A. Phinney, of the Jefferson County Power & Light Co., for excellence in scholarship, leadership and industry. Mr. Phinney said that he has met no student of better judgment, or of greater reliability than the recipient of this prize. Awarded this year to Vernon L. Mattson.

The Athletic association of C. S. M. gives a prize cup to each graduate who has received "all conference" honors for his excellence in any sport. That is, the man must be chosen as the best for his position in any school in the Rocky Mountain conference, which embraces the states of Colorado, Wyoming and New Mexico. It is awarded this year to Russell Volk.

The Petroleum Prize: A cash prize of $25 is given annually by Thomas S. Harrison of the class of 1908, now a consulting geologist of Denver, for meritorious work in petroleum engineering this year is awarded to Robert C. Diehl.

David W. Brunton, of Denver, inventor of the Brunton pocket transit, and other well known devices used in the mining industry, gives annually one of his pocket transits to the student who has done the most meritorious work in mining. It is awarded this year to Flavius C. Wood.

Mr. E. A. Phinney offers annually the Phinney prize of a Brunton transit for pre-eminence in athletics, leadership in student activities and proficiency in scholarship—the best all-around man. This year it is awarded to Russell Volk.

The Wolf Medal, for high scholastic attainments is given annually by Harry J. Wolf, of the Magazine of Wall Street, New York. Mr. Wolf was formerly professor of mining at C. S. M. The prize is based purely on calculation in grades and goes to the man making not necessarily the highest average grades, but for greater attainment. It is awarded to John L. Weller.

The A. P. Little cup, offered by Prof. A. P. Little to the campus organization most proficient in intramural sports. Awarded to Kappa Sigma.

The F. B. Robinson cup, offered by F. B. Robinson, of Golden, to the fraternity with the highest scholastic standing for the first semester. Awarded to Beta Theta Pi, with a rating of 83.57 per cent.

The Strausburg cup, offered by Max Strausburg, of Denver, to the campus organization most active in campus activities, awarded this year to Mu Epsilon Tau.

**Engineer of Mines**

Arch Frank Boyd, Gold Hill, Colorado.
Robert Joseph Brennan, Pottsville, Pennsylvania.
Leroy Taylor Brown, New York City, N. Y.
Robert Stewart Brummett, Mitchell, Nebraska.
Harry Edwin Clarke, Rochester, New York.
William White Cormack, Richmond, Virginia.
George Harold Cronin, Aberdeen, Maryland.
Arthur Presley Davidson, El Paso, Texas.
Charles Whitehead Desgrey, Yonkers, New York.

Max W. Dessau, Phoenix, Arizona.
Robert Johnson Dunbar, Johnstown, Pennsylvania.
Edgar Paul Evans, Coalton, Ohio.
Michael Petrovich Fominyh, Uralsk, Russia.
Chester George Frees, Chicago, Illinois.
Fred Daniel Gibson, Golden, Colorado.
Kenneth Edward Hickok, Ulysses, Kansas.
Shou Chung Hsia, Hangchow, China.
Constantine Lavr Ivanoff, Harbin, China.
Francisco Gonzales Joaquin, Manila, Philippine Islands.
Feral Herbert Johnson, Gray, Oklahoma.
Jack Arthur Martin, Raton, New Mexico.
Vernon Linnaeus Mattson, South Charleston, West Virginia.
Harold McConnell, Torpedo, Pennsylvania.
Maxwell Leland McCormack, Denver, Colorado.
John S. McGhee, Wellston, Ohio.
Harley Howard Montague, Denver, Colorado.
Jewel Eathen Morrison, Denver, Colorado.
Arthur Nels Nelson, Fertile, Minnesota.
William Jack Niemi, Eska, Alaska.
John Haviland O'Connor, Columbus, Ohio.
Arthur Lawrence O'Toole, Newark, N. J.
Carlos Posso, Vasquez, Cali, Colombia.
George Dewey Riggs, Klamath Falls, Oregon.
Henry Rogatz, New York City, N. Y.
Clifford Otto Rolston, Wilmington, Ohio.
Melford Hawley Salsbury, Denver, Colorado.
Archibald Alexander Sproul, Staunton, Virginia.
Leslie Samuel Taylor, Pueblo, Colorado.
Russell Herman Volk, Bucyrus, Ohio.
Richard Edwin Wagner, Kankakee, Illinois.
John Maurice Weller, Pineville, Kentucky.
Norman Whitmor, Denver, Colorado.
Flavius C. Wood, Jr., Denver, Colorado.

**Metallurgical Engineer**

Charles Scribner Beech, Stuart, Iowa.
Paul Dayton Bliss, Corning, Iowa.
Bernhardt Adam Miller, Denver, Colorado.

**Petroleum Engineer**

Albert Eldred Buell, Denver, Colorado.
Ralph Douglas Curtis, Denver, Colorado.
Robert Christopher Diehl, Santa Ana, California.
Jack Greenspoon, Denver, Colorado.
George Wilson LeMaire, Bayonne, New Jersey.
Dale Nix, Ponca City, Oklahoma.
John Alonzo Sheahan, Atlanta, Georgia.
Glenn Leroy Shepherd, Denver, Colorado.
Phineas Albert Washer, Denver, Colorado.

**Geological Engineer**

Martin Stephen Bender, Sharpsburg, Pennsylvania.
Quenton Lucius Brewer, Fort Collins, Colorado.
Arnold Sylvester Bunte, Grand Lake, Colorado.
Charles Gerald Bynum, Denver, Colorado.
Wayne Henderson Denning, Lincoln, Nebraska.
Parke Huntington, Hot Sulphur Springs, Colorado.
Milward Miller, Denver, Colorado.
Oran L. Peck, Tucumcari, New Mexico.
Robley Freeman Sopris, San Juan, Porto Rico.
John Tucker Stubbs, Denver, Colorado.
Gaylord Chase Weaver, Kremmling, Colorado.
Neil Haines Wills, Phoenix, Arizona.

**Chemical Engineer**

George Llewellyn Shue, Denver, Colorado.
George Williard Thomas, Cheyenne, Wyoming.

**Master of Science**

Edward Carl Krekel, Cleveland ,Ohio.
Fred Chester Bond, Wheat Ridge, Colorado.

## 47 Graduates Commissioned

### *Are Second Lieutenants In Engineer Reserve Corps; Splendid Address Made by Col. K. C. Mastellar*

FORTY-SEVEN men received commissions as second lieutenants in the engineers reserve corps upon graduation from the Colorado School of Mines this year. This remarkable increase is noted with considerable pride by recent graduates and reflects great credit on Capt. W. E. Lorence, commander of the Mines unit until 1924 and on Capt. Henry Hutchings Jr., present commandant. Each drilled the graduating group for two years. In presenting the commissions at graduation, Col. K. C. Mastellar, of Fort Logan, spoke as follows:

"It is with great pleasure and interest that I came here today, for I thoroughly realize that I am looking into the faces of a group of young men who are upon the threshold of interesting experiences. Momentous decisions you are to arrive at now and as you go along which are to be great factors in your future success and happiness.

"I wonder if you fully realize that upon the amount of idealism which you combine with your materialistic succuess will depend the happiness and satisfaction you will secure in your future lives. This idealism I would interpret for you as the amount and kind of service you render to your government, your community and to your fellow men. Upon the measure of your service, and not upon the materialistic success, will depend your usefulness, the regard in which you will be held, and your own satisfac-

"I have come here today particularly to present commissions in the Officer's Reserve Corps of the United States Army to the group of you who have taken, along with your academic work, a specific military training. I am of the opinion that this group has realized and commenced to put into practical application the idealism to which I have referred. I am going to suggest for your adoption and use the West Point motto: 'Duty, Honor, Country.'

"I desire to compliment the school upon the ever increasing number who are working for and making commissions in the Reserve Corps. The record for the past few years is that twenty-eight received commissions two years ago, thirty-four last year and forty-seven are to be commissioned this year.

"For the War Department I wish to thank the President and the Board of Trustees for their interest, and their co-operation with the Professor of Military Science and Tactics in building up this fine engineering unit of the R. O. T. C. The present year's class, while graduating before the school becomes a 'Distinguished College,' nevertheless has materially aided in obtaining this honor for the Colorado School of Mines, and to the members of the present classes and to the President and Faculty who have backed them is the credit due for the progress of the unit. I congratulate you upon this progress and the honor it will bring to the Colorado School of Mines.

"A commission in the Army of the United States is an honorable thing to have; a Commission in the Reserve component of the Army is an important thing to have; it will give its holder a prestige that would take much work in a civil profession or vocation to acquire; it is an evidence of leadership which you have acquired from your training and this, I am certain, will stand you in good stead in the work and responsibilities which you will now assume in civil life.

"I take much pleasure in presenting to you the commissions which testify to the faith your government has in your loyalty, your devotion to your school and country, and to the ability which you have displayed. I hope that each of you will so regulate his life that he may continuously merit the descriptive term, 'An officer and a gentleman."

The following named men received commissions:

Charles S. Beech, Martin S. Bender, Paul D. Bliss, Arch F. Boyd, Robert J. Brennan, Quenton L. Brewer, Louis V. Brown, Robert S. Brummett, Albert E. Buell, Arnold S. Bunte, Charles G. Bynum, Fred A. Carpenter, Harry E. Clarke, Harold C. Coombs, Ralph D. Curtis, Charles W.

(Continued on page 16)

# New York Section Offers Scholarship

*Gotham Branch meets May 24 and Transacts Much Business Including Decision to Reorganize; Scholarship Fund to Be Raised by Voluntary Subscriptions*

By Harry J. Wolf '03, Secretary

THE 63rd regular monthly meeting of the New York Section of the Colorado School of Mines Alumni Association was held at The Chemists' Club, 52 East 41st Street, New York City, Monday, May 24, 1926, at 7:30 P. M. Dinner was served at 6:30 P. M.

The following men were present:

W. M. Gebo, '23, c|o Ingersoll-Rand Co., 11 Broadway, N. Y.

Chas. D. Bennett, '25, c|o Ingersoll-Rand Co., 11 Broadway, N. Y.

L. M. Gross, '14, 25 Broad Street, N. Y.

C. Erb Wuensch, '14, 100 Broadway, N. Y.

Frederick S. Titsworth, 33 West 44th St., N. Y. (95.)

D. L. Beck, '12, c|o Cactus Sales Co., Bldg., 58 Bush Terminal, Brooklyn, N. Y.

J. H. Cairns, '23, c|o Ingersoll-Rand Co., 11 Broadway, N. Y.

John Griffin, '17, Westchester Co., Park Comm, Bronxville, N. Y.

F. V. McKinless, '23, c|o Ingersoll-Rand Co., 11 Broadway, N. Y.

J. C. Williams, '13, 39 High St., Passaic, N. J.

Theo. H. M. Champton, '14, South Bayshore Ave., Bayshore, L. I.

George H. Roll, '19, 247 Park Ave., N. Y.

Harry J. Wolf, '03, 42 Broadway, N. Y.

The following names of Mines men who are within the jurisdiction of the New York Section, were submitted to the secretary for record:

James Ballard, '25, 400 Riverside Drive, N. Y.

Elmer Lindberg, '24, 600 Riverside Drive, N. Y.

T. Q. Shrewsbury, c|o Maxwell & Co., 42 Broadway, N. Y.

The following business was transacted:

1. The meeting was called to order by Harry J. Wolf, who was elected temporary chairman.

2. A proposal to establish a Scholarship to be known as the New York Section Scholarship, was discussed. The belief was expressed that such a Scholarship could be financed by dues and voluntary contributions from members, and that it would be a source of satisfaction to the New York Section, and that it would receive the approval of the C. S. M. Alumni Assn., and the Faculty of the School of Mines.

3. It was resolved that the New York Section be reorganized under a suitable Constitution and By-Laws to be prepared by a committee and submitted at the next regular meeting.

4. Harry J. Wolf was elected chairman of a committee to prepare the Constitution and By-Laws, to be submitted for the approval of the New York Section and the Alumni Assn.

4. In order to start the Scholarship Fund, voluntary subscriptions were received from six of the members present. These subscriptions were for $25 a year for a period of four years. Subscriptions were then temporarily closed pending the development of the machinery necessary for the administration of such a fund.

6. It was resolved that no funds be solicited, but that the fund be designed to receive voluntary contributions from those who desire to offer financial support over and above the proposition of annual dues that might be devoted to such purpose. It was made clear that no member of the Section should be considered under any obligation whatever to contribute to such a fund, beyond the amount of his annual dues.

7. The method of selecting candidates for a Scholarship, and the methods of operating the plan were discussed, and it was resolved to refer the matter to a committee.

8. Frederick S. Titsworth was elected chairman of a committee to devise machinery for the operation of the proposed Scholarship Fund.

9. It was resolved that the New York Section propose to the Editor of the School of Mines Magazine, that a special department of this magazine be set aside for the regular presentation of business and news relating to the various local sections of the Alumni Assn., with a view to encourage the organization of such local sections and the stimulation of their activities.

# Preparation of Work is Recognized

*President Coolbaugh Introduces New Credit System That Includes Preparation With Lecture and Lab Work*

RECOGNIZING the value and importance of home study in the preparation of lessons, the Colorado School of Mines will use a system of "credits" next year that will combine preparation work with class attendance and laboratory investigation time in the evaluation of courses, it has been announced by President M. F. Coolbaugh. This marks an innovation in Rocky Mountain collegiate circles.

The new "credit" system is very simple. A long period of investigation has been made to evaluate each course properly for award of credits for preparation, class attendance and laboratory. Should a course require two hours preparation per week, two hours class attendance and three hours laboratory, the total "credits" allowed is seven. Unit periods of fifty minutes each are the basis of all credits. One such period per week throughout a semester is called one "credit."

Dr. Coolbaugh states that this method of awarding credits, although new in the Rocky Mountain region, has been successful with slight variations at Massachusetts Institute of Technology and California Institute of Technology. However, the system at Mines is different from any thing in existence in this country. According to the Mines president, the new method is merely a form of recognition for one of the fundamentals of education—preparation of work. Sometimes a short lecture course requires extensive preparation. Under the new system of evaluating courses this heavy outside work should be recognized.

# Report of Instruction Committee

*Urge Engineering Degrees be Given to Engineers Only and B. S. Degrees at Commencement*

By W. J. Hazard '97, Chairman

THIS committee was formed, as we remember it, to get in touch with the administration of the school, to find out the accomplishments of the year and the aims and policies for the future. This is for the purpose of keeping the alumni informed as to the progress of the institution.

The second purpose of the committee is to act as a clearing house for suggestions from the alumni regarding the improvements of the work of the school from any standpoint.

President Coolbaugh's policy was announced by him in a letter to the alumni a few weeks ago. In this outline of policy, he makes it clear that his ambition for the Colorado School of Mines is the production of quality, though the quantity may be small. We believe this policy to be thoroughly commendable.

We recognize that the cost per student is decreased by numbers, but this cost basis is no criterion of the total benefits to the state or nation and it is not necessarily a criterion of efficient administration.

Our information about the present plans and policies of the Colorado School of Mines has been obtained entirely from short conversations with President Coolbaugh and Dean Grant. Obviously this information can be put before you more pointedly and more authoritatively by these officers themselves than by the round-about way of the committee.

Before calling on them however, may we finish our own comments?

## Now They Cry For Descript

We understand that the cultural phase of such subjects as English, mathematics and chemistry is to be more strongly emphasized than heretofore. Amen. Students sometimes put mathematics in the same category as spinach. That is, good for what ails us, whether we like it or not. The dean of a law school not long ago made the statement that he would rather have his students take a good preliminary course in mathematics and engineering subjects than to take the supposedly cultural liberal arts course in history, philosophy, languages, etc., which the lawyer must eventually have. His reason was that such a course gave a man better training in organizing his work, a clearer and more comprehensive vision of his problems, and better judgment in gathering and culling his material.

Time was when descriptive geometry was considered (by the students) as designed primarily for the purpose of flunking freshmen. We understand that our present genial professor of descriptive geometry dispenses it in such pleasant doses that children cry for it.

The cultural value of chemistry (as it may be taught) can hardly be overestimated. A few years ago there was no such thing as colloid chemistry. Now it gives us innumerable contacts with the industries and with all life processes.

## More Cultural Training

In an article just received yesterday, Dean Baker, of Rensselaer Polytechnic Institute, emphasizes the need of this cultural and broadening aspect of engineering courses and seems to feel quite proud of the courses given by the Institute.

In giving a five year course in four by the inclusion of 16 to 18 weeks of summer work, and using a 54 hour week, the Mines is certainly taking several steps toward that ideal 100% load factor for the equipment. We believe, however, that the time is not ripe for running three shifts, because poor as Colorado is, the state can still bear the overhead expense of allowing the chairs and blackboards to rest while we eat and sleep. Stevens Institute includes summer work in its Mechanical Engineering course under the name of The Supplemental Term. Stevens also prides itself on the broad and cultural M. E. course that it gives, as a preparation for work in almost any engineering field.

We commend the administration very highly for the new credit plan which will tend to apportion the credit in accord with the total work involved in a course.

In pondering the second purpose of the committee we feel that we should be quite outside the bounds of our duties were we to recommend to the faculty that they eliminate some subject from the curriculum or that they add something else. It is not the business of the outsider to make suggestions to the operators of the mechinery with which they are in daily contact.

## Faculty Outlines Curriculum

The curriculum, present and future, is the business of the experts who constitute the faculty. The design of any machine for efficiency, effectiveness, low cost and maintenance, and long highclass service, is the business of the engineer who is thoroughly conversant with available materials and their properties and who can use these materials to the best advantage. This is the work of the specialist. Most design is a judicious compromise of requirements. When we want to dig a Panama Canal, we get the biggest man we can find, who is experienced in digging canals. Then we back up his outlined policy without too much fuss and quibbling over the details. The details are exceedingly important, but they are to be worked out by the boss with the help of his assistants, or perhaps worked out by the assistants with the approval of the boss.

In making the C. S. M. one of the foremost engineering schools of its type, we feel that we have a big job for a big man. Now that we have the man, let us indicate to him our idea of what we want, and leave the design and the details to him and his faculty.

Most engineering schools are alive to the increasing demands of the public on the engineering professions. How are these demands to be met by the schools? The S. P. E. E. is interested in the answer. Hence the employment of Mr. Wm. E. Wickenden to study the whole situation in the United States and the possibilities of producing a higher average product for the engineering schools. Mr. Wickenden has published some of the findings and recommendations based upon his two-year study, and of course, his completed research will in time be available for our use.

## All Values Are Relative

Many years ago we thought that steam pressures, super heats, transmission voltage and many other things had just about reached their limit. They hadn't.

Many years ago we thought that our engineering curriculum was saturated. We couldn't wedge in anything more. That was about correct. But that does not preclude improvement.

When C. S. M. was founded, the engineering degree was

commonly given for four years of college work. It was deserved. It is still given for four years of work in a very few schools. Twenty years ago, a dollar was worth about a dollar. Now it is worth about sixty cents. We do not, by any means, wish to imply that our C. S. M. degree is on a sixty cent basis. Far from it. We do mean to state, however, that values are relative.

### Course Is Nearly Five Years

Educational requirements are much higher today than a very few years ago for grade-school teachers, high school teachers, and college instructors. The industries and the public in general are demanding better educated and more highly-trained men in all sorts of fields.

We would not suggest that it is at all necessary to be "in style" in educational matters except that certain generally accepted standards have been recognized by thousands of educators and engineers and anyone who refuses to recognize these standards and sets up his own, is sure to be regraded with something worse than suspicion.

Dean Grant has explained that the work required for the enginering degree is really closer to five years than to four. We have no quarrel whatever with that statement, but it will not always be easy to explain to the outsiders, why twenty-four hours in Golden is any longer or broader or deeper than twenty-four hours in Ithaca, Champaign, or Ann Arbor.

This question of the degree has been discussed at Mines every little while for the past thirty years, to our personal knowledge.

### Award E. M's to Engineers Only

Your committee has but this one suggestion to make for the consideration of the faculty. We believe that it would be to the permanent advantage of the school and its graduates to give the B. S. degree at the end of the four year course. This could be followed in two years or at any subsequent time, by the appropriate engineering degree, when the graduate has shown his successful connection with engineering work.

It will be raising and not lowering the standard of the school. It will not interfere with any graduate's job, for the employer is not interested in the letters after a man's name, but rather in, "What have you done?" "What can you do?"

It will be in accord with generally accepted engineering school practice, in the letter of the law, and can be done in the spirit of the law as well.

It will not require another year of school work for the degree.

It will give all graduates a degree of which they can be proud.

It will reduce the number of "engineers" who are not connected with any phase of engineering.

It will not keep any graduate who continues in engineering work from obtaining his E. M.

We close our report with most hearty commendation of the progressive work of President Coolbaugh and Dean Grant.

Respectfully submitted,

Wm. J. Hazard, '97, Geo. A. Kennedy, '95, E. R. Ramsey, '12.

## WE WANT

*Every Alumnus in Golden on Homecoming Day, Nov. 6. We are giving you plenty of notice. Arrange to be not "too busy."*

## Winners in Sentinels of Safety

*Extraordinary Records of Mines and Quarries in Accident-Prevention Campaign Are Revealed*

EXTRAORDINARY records of large industrial production with no loss of time occasioned by accidents were revealed in connection with the announcement made April 29th by Secretary Hoover of the Department of Commerce, of the names of mines and quarries adjudged winners of the national safety competition held under the auspices of the Bureau of Mines, for the bronze trophy "Sentinels of Safety," donated by the Explosives Engineer magazine. A Maryland quarry operated 350 days and worked 202,663 man hours during 1925 with no loss of time from accidents. Four other quarries, located in Indiana, Tennessee, New York and California, also operated with no loss of time due to personal injuries. In addressing congratulatory letters to the winners, Secretary Hoover vizualized the great economis benefits, both to producers and consumers of coal, ore and stone, from this nation-wide effort to prevent accidents, in which during its first year more companies and individuals had participated than in any other organized safety contest.

Nearly 300 of the largest mines and quarries participated in the competition, the contestants being divided into five groups; anthracite mines, bituminous coal mines, metal mines, mines producing non-metallic minerals and quarries or open pit mines. A replica of the trophy is awarded to the mining operation in each group sustaining the smallest loss of time from accidents in proportion to total time worked during the year. Determination of the winners was made by a jury of award comprised of officials of various mining and quarrying associations, the National Safety Council, and the American Federation of Labor, based on a tabulation of mine accident data prepared by the Bureau of Mines. A feature of the competition is the awarding of a certificate of honor, signed by the Director of the Buerau of Mines, to every employee of each of the winning mines and quarries for their share in the low accident records made by their companies.

### Winning Groups Announced

The winners in the anthracite group is the Upper Lehigh mine, Upper Lehigh, Pa., operated by the Hazle Brook Coal Company. In this group, honorable mention was accorded the Midvalley mine, Wilburton, Pa., operated by the same company.

The winner in the bituminous coal mining group is No. 6 mine of the United States Coal and Coke Company at Gary, W. Va. Honorable mention was given the No. 3 mine of the same company, also located at Gary; and the Rossiter No. 4 and 5 mine, at Rossiter, Pa., operated by the Clearfield Bituminous Coal Corporation.

In the underground metal mining group, the New York zinc and lead mine of the New York Mining Company, at Picher, Oklahoma, was adjudged the winner. Honorable mention was accorded to Beaver lead and zinc mine of the Commerce Mining and Royalty Company, at Carden, Oklahoma; the Velton zinc ore mine of the Eagle-Picher Lead Company, Bricefield, Mo.; the lead mine of the St. Louis smelting and refining works of the National Lead Company, at St. Francois, Mo.; and the Goodwin lead and zinc mine of the Eagle-Picher Lead Company at Picher, Okla.

In the group of underground mines producing nonmetallic minerals, the trophy was awarded to the Lower gypsum mine of the United States Gypsum Comapny, at

(Continued on page 15)

# Scholastic Attainments Are Recognized

*F. B. Robinson of Golden Awards Handsome Cup to Beta Theta Pi For High Rating; Interesting Figures Compiled by T. C. Doolittle*

SCHOLASTIC attainments at the Colorado School of Mines are now rewarded by F. B. Robinson, genial owner of the book store bearing his name. The reward is the Robinson cup, a splendid trophy to be awarded annually to the fraternity on the campus that has the highest average scholastic rating according to a system worked out and sponsored by T. C. Doolittle, registrar. Beta Theta Pi was awarded the beatiful cup at the commencement exercises. The fraternity average was 82.16, while Kappa Sigma, nearest competitor, had a rating of 78.46.

In making the survey some very interesting figures were compiled and recapitulations show startling group standings that were recorded in the daily press throughout the country. T. C. Doolittle investigated scholastic standings from every conceivable angle, giving students and organizations their individual and group rating. The book is bound and a copy has been placed in the library where it is accessible to all. Each student knows exactly how he stands in relation to his fellow students, and is thus given an incentive to do better work.

In awarding the Robinson cup this year, figures were based on first semester grades only. Next year, the 1925 second semester and the 1926-1927 first semester grades will be the basis of the award. This method is necessary in the future because second semester grades cannot be compiled for commencement day when the cup is awarded.

### School Average Is High

The method of computing grades follows: A grade is equivalent to 95; B, 85; C, 75; D, 65; E, 40; Inc., not counted. The average number of active members and pledges of a fraternity over the semester considered, is taken as the number of men in the organization. The sum total of credit hours carried by these men is divided by the number of men, to give average hours carried. Each man's average, multiplied by hours carried, gives total number of points. These points are added together and divided by number of men to give average number of points. The sum total of rating averages, divided by number of men, give average rating.

It was found that the school average was 77.15. The freshman class was rated at 69.67; sophomore, 75.82; junior, 80:29; senior, 86.76; post graduate, 86.84.

The fraternities finished in the following order: Beta Theta Pi, 82.16; Kappa Sigma, 78.46; Mu Epsilon Tau, 77.59; Sigma Alpha Epsilon, 76.46; Sigma Phi Epsilon, 76.10; Sigma Nu, 73.72; Eta Omega Delta, 72.35.

### Married Men Better Students

It was brought out that married students are better students than single men; nonfraternity men rate higher scholastically than fraternity men; foreign students get higher grades than Americans; football men are slightly below the school average, and scholarship holders are better students than tuition-paying men.

There are sixteen married men at school and their average grade is 84.38, compared to 77.22 for single men. H. H. Montague with a rating of 91.52, leads the benedicts.

E. G. Dalmus with an average of 93.64 leads the thirty football men whose combined average is 75.57, slightly below the general school average.

Long hours of practice seems to help the men who play in the band. Thirty men are listed with an average of 79.81. There are twenty-eight foreign students with an average of 81.48. High honors of this group go to M. P. Fominyh, of Russia, with a grade of 91.00.

Seventy-eight men are fortunate to hold scholarships and their average is 82.01 while non-resident holders are rated at 76.39.

Residents of Colorado do not fare so well as those who are registered from outside the state. The average of 191 Colorado men is 76.17, while the outside group, numbering 199 men, average 78.70.

### R. J. Brennan Honor Man

Examining classes in detail, it is disclosed that there are 107 men in the freshman class with a combined rating of 69.67, just below passing. Football men of this class average 71.94. H. A. Dumont is high man with 94.31.

One hundred and sixteen sophomores are graded at 77.82. E. G. Dallmus is high man with an average of 93.64. The juniors fare considerably better with an average of 80.29, with 79 men. E. Strantskey is honor man with a grade of 92.62.

Seniors have the unusual rating of 86.76 with 68 men. Robert J. Brennan of Beta Theta Pi leads this group, and incidentally the whole school, with a grade of 95.00.

Twenty post-graduates average 86.64 with F. Cadena high man with a rating of 94.49.

The primary purpose of the trophy—an incentive to scholarship—is obviously bearing fruit. The student body is keenly interested in the figures published which show each man his comparative standing according to unbiased records. Fraternities are anxious to win the handsome cup Mr. Robinson will award each year to the best scholastic fraternity. A decided departure at Mines, the Robinson cup is an innovation that will soon be a tradition.

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# Attending Camp in Texas

*54 Students Taking R. O. T. C. Work To Qualify For Commissions at Graduation; Capt. Cole in Charge*

IN CHARGE of Capt. H. L. Cole, 56 Mines students are now now in camp at Sam Houston, Texas, learning the fundamentals of military engineering. Last year the camp was held at Fort Logan. The following named men are in attendance:

J. H. Abbott, Glenn Allen, R. F. Angus, M. S. Bender, R. E. Bond, G. E. Bretschneider, W. S. Briscoe, L. V. Brown, A. E. Buell, Garrett Craig, J. V. Crowe, P. W. Cunningham, William Curry, E. G. Dallmus, Salvatore DelRio, A. S. Donnelly, M. G. H. Donnelly, J. C. Dyer, D. D. Faller, Glen Fassler, R. H. Fertig, Victor Fumetti, D. I. Gahagan, E. F. Gallagher, William Hagler, Frank W. Harsh, L. H. Henderson, F. B. Kinley, G. W. LeMaire, Walt Lofgren, Fred Mattei, H. W. McCullough, R. S. Much, A. R. Patten, Chas. Patten, Adolph Pfeil, Leo Thomas Regan, L. B. Roberts, T. C. Rupnik, C. G. Scott, G. L. Shepherd, C. A. Smith, Jr., Gus Soltz, Robley Sopris, J. H. Seaver, M. I. Stein, Glenn Stephens, J. D. Tolman, William Throckmorton, I. C. Thorley, Kenneth Viland, G. E. Wagoner, Cecil Walbridge, Phinaes Washer, H. R. Williamson, T. E. Zadra.

# The Divine Right of Alumni

*Humor and Truth Combine to Make This An Excellent Aritcle For All Alumni of American Colleges*

(From the Independent)

RUGGLES threw down the Brightyears University Alumni Review with an exclamation of rage.

"The most curious of all American delusions," said he, "is that the graduates of a university are in some mysterious way fitted to say how it shall be run."

"What's on your mind now?" I asked.

Ruggles pointed at the Alumni Review lying on the table. "In this harbinger of enlightenment," he replied, "is a letter from Duncan, '99, actually given the dignity of print, in which he points out that the educational standards of Brightyears are higher than those of Motherofmen University, thus doubtless depriving us of valuable tackles and half backs who now go to Motherofmen because they can't make the grades at Brightyears. According to Duncan, all universities should have the same standards, because otherwise, their teams won't have an even break. He calls on the alumni to right this hideous situation by seeing that Brightyears lowers its standards. The worst of it is that probably they could do it if they tried, and some of them may try. The alumni, after all are very powerful.

"You can argue that a university should be run by its students," continued Ruggles, getting up steam, "because the students are getting the education; or by the parents, because they are paying for it; or by the professors, because they are giving it; or by the state, because it is concerned about the training of its young men or by experts in education, because they presumably know something about it. But what on earth is there to be said for the graduate body? In no other country, so far as I am aware, do the graduates try to run the universities. It is a new American development; the first step was the organization of athletics and cheering sections; the second was the growth of loyalty among the alumni; the third was the capitalizing of this loyalty by asking the alumni for money; the fourth is the tendency of the alumni to dictate to the institution to which they give."

I was becoming restive. "But to begin with," said I, "the graduates have had four years there."

"Yes, but when? Ten or twenty or thirty years ago; and even then, most of them saw very little of it—especially if it was a big and complex university—and comprehended less. Does four years of fraternity life give a man a special insight into the work of the astronomical observatory or the department of forestry? The chances are that in 1899, when Duncan graduated, he didn't know whether there was an observatory or not, and that during the past twenty-six years, whatever vague notions he had on the subject have become still vaguer. His ignorance of the university as a whole is abysmal, and most of the things he remembers about it aren't so, having changed in twenty-six years.

"To let Duncan and his like control the policy of the university is exactly as reasonable as to deliver the government of a town to those who left it at the age of twenty-two and haven't been back since except for Old Home Week, or to turn over the management of a railroad to a group of ex-commuters who used to ride on it, but have moved away."

"You forget Duncan's loyalty," I put in. "He loves his university."

"Sentimentally, yes," said Ruggles. "He gets in a glow when he hears the old songs with those never-to-be-forgotten words:

> "Rush victorious down the field
> Till the last white line is o'er!
> Brightyears men will do or die
> To see old Brightyears score!

"He loves the football games, his fraternity, the old ivy on the buildings, and the memories they bring back to him; he feels a half-worshiping, a half-condescending affection for some of his former teachers; and sometimes he can be marshaled to organize a drive—in the approved chamber of commerce style—to raise a few million for the poor, underpaid professors; but his interest in the intellectual life of Brightyears never reaches the boiling point. I'm not even sure he has ever realized that it has an intellectual life.

"When Duncan goes back for Commencement and his reunion and the Motherofmen baseball game, does he visit the School of Fine Arts or discuss methods of instruction with the head of the English department? The chances are twenty to one that he goes straight to his fraternity, thumps his old friends on the back, consumes considerable gin, mourns the passing of the old fence or the old drinking places of something else that the university is better off without, puts on a clownish costume and parades to the field, yells himself hoarse for Brightyears, and returns home very sunburned and exhausted without having exercised a cubic millimeter of his brain. He would laugh at the idea that his reunion is a pilgrimage to the fount of learning; it is a barbarian riot for which the clownish costume is highly appropriate. There is, I suppose no reason why Duncan should not behave this way if he chooses; but does such an experience fit him to control educational policy?

"When President Myrtle visits the Brightyears Club, of St. Louis or Detroit or almost any other city, the graduates swarm loyally about him and, suddenly realizing that they know nothing about the Brightyears of the present day, ask him for the real low-down on it. 'Give us the straight inside dope,' they say; 'it's what the fellows all want to hear.' 'Do you want to hear about the new program for the Graduate School of Economic Research?' asks President Myrtle eagerly. 'Yes, yes, they cry, and they mean it—for the moment. But when dinner time arrives, and Jake Butcher, '05, is handing around his flask, and all the boys are there, and they get to singing songs,—with a hired pianist to play jazz between whiles,—somehow, the Graduate School of Economic Research seems a little out of place. All through President Myrtle's speech there is a table of merry alcoholics at the back of the room who can be heard asking each other, 'Whash he talkin' about?' and being sh-sh'd into silence; and the gloomy faces of the rest of the diners suggest that of course Myrtle is a great man and they all want to get his straight dope, but, after all didn't they come here for a good time? A great surge of life goes through them when the toastmaster utters the words 'football team,' thus injecting a note of reality into the proceeedings.

"Ask any official of the Brightyears Club, for that matter, how to get the graduates out for the annual dinner. Offer them a talk by the dean? Not if you want a turnout.

(Continued on page 14)

# Volk Wins Fifteen Letters

*Sensational Miner Athlete Leaves Record That Surpasses Anything in Mines Athletics*

WHEN the last man was out in the ninth inning of the Mines-Colorado university baseball game, the curtain was rung down on the athletic career of one of the greatest conference athletes of all times, and one of the few immortals of Mines athletic history—"Rut" Volk.

Fifteen letters were won by the scrapping Mines—all of them in the most strenuous of sports. Three were won in football, three in baseball, one in basketball, four in boxing and four in wrestling. Conference boxing champion for three years, all-conference grid center twice, and second choice on all-conference baseball team for two years are some of his outstanding achievements. In addition, for four successive years he threw conference wrestling champions in the heavy and light-heavy divisions, but never entered the wrestling finals, because he chose to represent the Blue and White with the gloves.

In reviewing his achievements in his four years at Mines, the outstanding event is remembered as his fight with Hinds of Aggies for the conference light heavyweight championship. How the Miner freshman exchanged punches with the Aggie demon for three rounds—the first

RUSSELL VOLK, '26

man to go the route with the Farmer slugger—is conference history. How the scrap ended in a misunderstanding is regretted by sport fans who would have welcomed a real verdict. But few persons know that after the bout, the veteran Hinds had his medal cut in two and gave Volk a half, saying the 17-year-old Oredigger had won a moral victory.

While his athletic career is outstanding, Volk was also a good scholar and a leader on the campus. He was president of the class in 1924 and this year he is president of Sigma Gamma Epsilon national honorary engineering fraternity; president of the Mines Christian association; president of the "M" club and a member of Mu Epsilon Tau fraternity.

The esteem in which he is held by the student body is evidenced by the honors they have given him. No. 12, his football number, has been withdrawn from circulation and he is the proud possessor of a huge silver cup and a Brunton transit, presented to him last fall by the student body.

After graduating he went to his home at Bucyrus, Ohio, to visit with his parents for a few weeks before leaving on a trip to Europe June 26 as national chairman of the Pilgrimage of Friendship, an organization for the purpose of letting foreign colleges know what American institution are doing. His full expenses will be paid. On his return, August 31, he will enter his chosen profession, oil geology and will enter the employ of the Pan-American company at Venezuela, South America.

Thus passes one of the greatest athletes this region ever has known.

# Mines Aids Mapping of Colorado

CO-OPERATION of the Colorado School of Mines and the Colorado Metal Mining fund with the federal government makes possible the topographical geographical survey of mining areas of Colorado, now underway in charge of H. H. Hodgeson, head of the topographical department of the United States bureau of mines.

The state auditing board recently appropriated $20,000 to the school for completion of ore-testing laboratories and for completing the geographical survey. $15,000 was authorized for the survey and the Metal Mining fund promised assistance to the amount of $10,000, while associated industries donated an additional $10,000. The government will match this figure with $35,000, thus assuring a fund of at least $70,000 for the work.

Mr. Hodgeson was on the campus early in May and conferred with Prof. H. W. Gardner of the civil engineering department, relative to securing some students for summer work. A number of students are now connected with the various parties.

The topographical survey will necessarily precede the geological survey, which was started June 1, under the direction of the United States bureau of mines, which expects to continue the work three years and to provide Colorado miners with up-to-date maps.

Among the districts to be given topographical surveys are the Bonanza district, Taylor park, Iola to Buena Vista, and Carbondale to Marble. In addition, a thorough survey will be made of 750 square miles of oil shale lands in western Colorado. Levels also will be run on the farming districts from Cheyenne Wells to Burlington, Holyoke, Wray, Julesburg, Sterling, Fort Morgan and La Salle, and from Cheyenne Wells to Lamar, La Junta, Pueblo and Springfield, Colo.

"Colorado has entered a new era of mining activity and it is the right time to take stock," said M. B. Tomblin, secretary of the Colorado Metal Mining fund and the Colorado Metal Mining association.

"The topographical and geological surveys will provide accurate maps for mining men and will go a long way to helping in the discovery of new mining fields and the development of old ones. The survey is of benefit to all railroads entering our mining areas and all power companies giving electric service and to the mills and smelters of the state.

"While the United States Geological survey will have direct charge of the work, it will act in co-operation with the Colorado School of Mines, the Colorado Metal Mining fund, of which Jesse F. McDonald, of Leadville, is president. Aiding this board will be J. Wellington Finch, Thomas B. Stearns and W. H. Leonard, president of the Denver Rock Drill company. Any organization donating funds to the work can also have a representative on the board of advisors."

# Coach Given Vote of Confidence

*Discussion of Athletics at Annual Meeting Indicates Lack of Material at Golden and Prexy Calls for More Organization*

By Monty Budd '24

RAYMOND O. Courtright, coach at the Colorado School of Mines for the past two years, was given a unanimous vote of confidence by the alumni at the annual meeting of the Association at the Albany Hotel May 22nd. The vote was called for by Fred Steinhauer '99, after members had debated for more than an hour on the athletic problem at Golden. The debate was called for by President Reinhard after James Steele '00, chairman of the alumni committee on athletics had made his report to the Association.

## Great Lack of Material

As President Reinhard pointed out, Mines has not had a great deal of athletic success in recent years and it was up to alumni to find out the trouble, know the problem to be solved, and then pitch in and solve the problem. After prolonged discussion, it was the consensus of opinion that the greatest defect in the Mines athletic system was the lack of material. Two members, Van Burgh '17, and Briber '16, were emphatic in their statements that the spirit was lacking and Van Burgh came out flatfooted and declared the coaching was to blame because last year "our men couldn't tackle, had no defense against the forward pass, couldn't run interference, didn't know how to charge—in fact they were minus the very fundamentals of the game." Later Van Burgh stated his sweeping charges were made more for the purpose of getting a rise out of the assembly than for anything else. He believed Courtright should have more time to prove his coaching system and believed we should do more to get men here.

## Report Is Made

Jim Steele, '00, quarterback in the late 'Nineties, delivered his athletic report without notes but with great feeling. "So far as I can find out from students and members of the faculty, the coach is all right, but he has no material. Fraternity politics are absent at Golden and there are no hired men on the teams. And, in this connection, I hope I never see the day when I go out to a football game and see hired men playing the game for Mines."

Steele thought it was entirely a matter of getting material to Golden, but admitted he was open minded on the subject and requested President Reinhard to find out the opinion of those present.

"Toughy" Wolf, '14, considered one of the best backfield men who ever wore the Blue and White, gave a splendid talk on the situation as he saw it. Declaring that times are different from the days when he played the game, he said it was desirable to pick high school stars and make them into varsity players. There was a time when this was not necessary, he stated, but a concerted effort should be put forth by all Mines men NOW to get these men lined up for Golden before they go somewhere else. He thought there should be jobs for athletes at Golden and was of the opinion that Blue Key should keep this department of its work well organized. He said he had two Greeley men lined up to enter Mines in the fall.

## Coolbaugh Says "No Organization"

Prexy Coolbaugh, when asked to speak, declared the problem resolved itself into a problem of organization. At the present time, there is no organization in regard to athletics; there is no concerted effort to obtain men of pronounced high school athletic ability. In addition, there are many other factors of organization that enter into the problem and it remains for everyone to organize and get athletics at Mines in its rightful position.

Dean Grant, member of the school athletic committee, gave a complete and frank talk on the situation as he could analyze it. Lack of material was a very important factor in our athletic decline, he said. He had investigated Courtright's record at Nevada and found out that "Corky" had played regular men in all games and was held in high regard for his coaching ability. He knew, he told the assembly, that Courtright had taught his men the very fundamentals of which Van Burgh spoke and related how the coach told him early last fall that the men weren't getting the fundamentals as they should. With only one assistant, the coach was almost powerless to do everything—teach fundamentals, evolve formations and get the frosh team lined up. In fact, the frosh team, which must be used to scrimmage the varsity because of the limited number of men out for practice, is not getting necessary training and when the men are eligible for the regular team, they must be taught the fundamentals of the game. We have had no regular frosh coach for years. Last year two students tried to handle the job; they did the best they could, but naturally could not give their men much instruction. Previously, "Jim" Little devoted his time to coaching the team in the fall, but with constantly changing formations and working under half a dozen coaches, he could hardly be expected to have men prepared for Courtright's varsity.

Coach Courtright

## High School Stars Fail

The failure of high school stars to make good this year was very disappointing, the Dean stated. Some were crack-

ed up to be veritable football demons, but they were fizzles from the start.

In the Dean's opinion, Courtright needs more time to prove his worth.

Frank Briber, '16, was of the opinion that the old fight seems to be absent.

"Pi" Warren, '14, thought the Denver men were not doing their share. There is no Denver section of the Association, he said, and told the crowd that if a live Denver section were organized it might take an interest in Denver high school athletes and encourage them to attend Mines.

Steinhaurer then took the floor. Last year's football record wasn't bad, he said. We defeated Denver University for the first time in years and came within an ace of beating Colorado University. Such a record is commendable and he moved that Courtright be given a vote of confidence by the alumni present, inasmuch as his name had been freely used in the discussion. The alumni responded to a man, whereupon several men, including Van Burgh and others who had spoken before, pledged their unqualified support to the coach in the future.

It was the first time in years that the athletic situation was aired to the skies and all feel that it did a world of good to get it out of our systems. It means, in short, that organization is vitally necesary for Mines to be an athletic contender in the Rocky Mountain conference.

## THE DIVINE RIGHT OF ALUMNI

(Continued from page 11)

The thing to do is to offer them slow movies of the Motherofmen game interpreted by the assistant back-field coach who as a drawing card ranks somewhat ahead of President Myrtle.

"Yet Duncan, despite his difficulty in getting interested in the Graduate School of Economic Research, is so loyal that when somebody tells him that the faculty has decided to substitute oral for written examinations in history, he feels personally insulted. 'Nobody asked his opinion first,' he says. 'Why can't the university consult its commonsense alumni before going in for these highbrow educational schemes?' Duncan can't help remembering too, that his nephew flunked one of those oral examinations last year, which shows that nowadays they penalize the best Brightyears type—big, upstanding boneheads who know just how wide a pair of trousers should be cut and how to get down the field under punts.

"The fact is, of course, that the plan has already been meticulously described in the Brightyears Alumni Review, in the very issue that contained the report of the Brightyears-Motherofmen game. President Myrtle, you see, had tried to give the graduates advance information. But Duncan didn't read the description. Duncan never reads that academic stuff if he can help it—and if he does, it doesn't sink in. He glanced it, yawned, and turned to the page that began: 'Before a throng of 39,000 frenzied partisans, the Brightyears football team overwhelmingly defeated Motherofmen . . .'

"Yet you will never be able to convince Duncan that he is being properly informed. What is more, nobody will try to convince him. Certainly, President Myrtle won't. What, offend the graduates? Better handle them very tenderly. They can raise cain."

"But I object," said I, "to your generalizing from this man Duncan. You must be aware that the graduate body is made up of all sorts of types."

"Generally speaking, the Duncans are the most vocal type. They are always to be found among the professional Brightyears men, the prominent alumni, the men who lead the cheers and pass the hat to build a new stadium. So when the alumni body speaks, though it contains many men quite like Duncan, its collective voice is strangely like his.

"Then you admit that there are intelligent graduates?" I asked with some relief. "I was beginning to wonder why you thought it worth while to go on with this education business if you had so little use for the results."

"Of course I admit it," said Ruggles. "Thousands of them. Not only that, but I admit that Duncan himself is intelligent. He applies a perfectly good mind to his cotton business. But don't you see the difference beteween Duncan on business and Duncan on education? Business he approaches rationally.

"Put Duncan on a responsible board of trustees, give him time to study the university, talk with the professors, and learn that the problems of education and research deserve the hardest and most reasonable thinking of which he is capable, and he probably will do no harm. Put a more thoughtful graduate on such a board, and he may be of real value. Don't get the absurd notion that graduates should be disqualified from holding trusteeships of limited power; their prior acquaintance with the university and their effection for it are assets—provided they realize that these assets will not alone suffice. But give Duncan and his like the right to dictate policies from a distance without preliminary study and without accepting responsibility, and you have a rule of ignorance.

"You know as well as I that one great American university had recently to choose a non-graduate for president on account of a split between two social groups in the college—as if the chief duty of the president of an institution of learning were to arbitrate questions relating to the undergraduate societies! That shows you the alumni view. You know that in many American colleges a president or board of trustees that tried to make radical changes in the organization of athletics or in the fraternity system, would have an army of angry men to contend with. You know of brilliant instructors thrown out of their positions because graduates, more zealous for the safety of business than for truth, declared them dangerous. Is it rash to predict that if our universities should fall still further into the grip of the alumni, their days of free experiment and adventuous leadership would be over?"

"But the graduates," said I finally, "give a lot of money to the university. shall they not say how it is to be spent?"

Ruggles turned fairly purple. "No!" he cried. "I'm sick of this everlasting talk of money and its power. Money can buy enough things already in this sweet land of ours without reaching out and buying the direction of our universities. If there's any body I'd like to see shot at sunrise, it's the fellow who says, 'Run the place my way or I'll see that you don't have the cash to run it at all.' What we graduates have got to learn to say is, 'Accept my contribution to spend as in your expert judgment you see fit.' Commencement has higher privilege than to enable young men to find things higher than commercialism. In short, we must keep our hands off."

Ruggles picked up the Alumni Review again, opened to Duncan's letter, and ra nhis eye over it.

"That ass, Duncan," he muttered after a moment. "Somebody ought to answer his rubbish . . . I have a mind to do it myself."

(Continued on Page 16)

### SENTINELS OF SAFETY

(Continued from page 9)

Gypsum, Ohio. Honorable mention was accorded the Ironton underground limestone quarry, operated by the Alpha Portland Cement Company, Ironton, Ohio; the Crystal City sand mine of the Pittsburgh Plate Glass Company, at Crystal City, Mo.; the limestone underground quarry of the Alpha Portland Cement Company, at Milltown, Indiana; and the Ball underground high calcium limestone quarry of the American Lime and Stone company, at Bellefonte, Pa.

#### Trophy By Famous Artist

In the quarry and open pit mine group, the winner is the Security quarry of the North American Cement Corporation, at Security, Md. Honorable mention was accorded the cement rock quarry of the Louisville Cement Company, at Speed, Ind.; the limestone quarry of the Dixie Portland Cement Company, at Richard City, Tenn.; the Cementon quarry of the Alpha Portland Cement Company, at Cementon, New York; and the andesite quarry operated by the City of Los Angeles Harbor Department on Catalina Island, Calif.

Companies operating a coal mine employing 50 or more men underground, a metal or other mine employing 50 or more men underground, or a quarry or open pit mine employing 25 or more men in the pit were eligible to compete for the trophies. The trophy, which is the work of Begni del Piatta, designer of the Navy and Marine Memorial to be erected in Washington, portrays in bronze a mother and child greeting the father upon his safe return from work. The names of the mines and quarries who win the right to hold the trophy for a year will be engraved on the pedestal. On the remaining sides of the pedstal are panels emblematic of coal mining, metal mining, and quarrying and open-pit mining. The trophies will be bestowed upon the winning companies at the International First Aid meeting, to be given under the auspices of the Bureau of Mines at San Francisco, early in September.

Members of the jury of awards were as follows:

H. Foster Bain, secretary, American Institute of Mining and Metallurgical Engineering, New York; James F. Gallbreath, secretary, American Congress, Washington, D. C.; W. H. Cameron, managing director, National Safety Council, Chicago, Ill.; H. L. Gandy, secretary, National Coal Association, Washington, D. C.; A. T. Goldmeck, director, engineering bureau, National Crushed Stone Association, Washington, D. C.; William Green, pesident, American Federation of Labor, Washington, D. C., and H. G. Jacobsen, manager, bureau of accident prevention and insurance, Portland Cement Association, Chicago, Ill.

## Mine Prop Recovery

THE proportion of props that is recovered in room-and-pillar mining, in different mines in this country varies from none to more than 50 per cent under favorable conditions, according to Harry E. Tufft, mining engineer of the Bureau of Mines, Department of Commerce, who was recently detailed to a study of the subject. The amounts recovered depend on the character of the roof, the pressures developed, and the care taken to save the timber. At many mines no effort is made to draw props, as removal is not considered practical on account of the hazards involved; at other mines props are drawn wherever it is considered safe to do so, the amount recovered varying greatly in different rooms. Very few coal companies, however, recover more than a low percentage of the props. In some Alabama coal mines, about 25 per cent of the room props can be recovered in some rooms, under favorable conditions. A much greater recovery is said to be obtained in certain mines of the Pittsburgh bed, western Pennsylvania, where it is reported that under favorable conditions nearly two-thirds of the props can be drawn and used again. This, however, is exceptional.

In the recovery of mine props, two important factors that influence the amount recoverable are the quality and size of the props used, and the time required to work out the room or section that must be completed before the props can be pulled. This is illustrated by the experience of some of the large Illinois coal mines. In these mines, which are worked on a room-and-piller panel system, a large proportion of the props were formerly salvaged for reuse. At that time round mine props of very good quality, measuring five in ches in diameter at the tip, were being obtained. The mines were operated steadily and the time required to work out a panel was approximately eighteen months. Many panels when abandoned contained a large proportion of sound timbers which were recovered and reused two or three times. The number of props recovered from a given area of roof was greatest for the area near the face, since these latter props had been in place the shortest time. In recent years, owing to the fact that the prop timber obtained is of poorer quality, that many of the props are split from round logs, that the acceptable diameter has been reduced, and that the workings advance more slowly under part-time operation, little, if any, of the timber can be recovered when a panel is finished. Mine props are usually drawn only by experienced men.

In some mines a locomotive and cable have been used to draw props that have been in place only a short time and have not yet taken the weight of the roof.

Ordinarily props are drawn by a gang of four or more men working under an experienced foreman. The timber, when recovered, must be brought to the roadways whence it can be hauled to the working place where it is to be used. If the timber is blasted down, much of it may be so split and broken that it is worthless for resetting.

When props or timber sets are broken by crushing after they have been in only a short time, or are broken in an effort to recover them, the broken pieces can be sawed into cap pieces, wedges, sprags, track ties, or used in building timber cribs. Some companies have installed portable sawmills on the surface for dressing broken timber into useful shapes.

Mine ties, when in good condition, are usually taken up in worked-out rooms and passages, and relaid in new workings. If the track has been maintained in good shape, the ties can probably be reused at least once. A tie that is badly worn by rail cutting or injured by spiking can usually be turned over for reuse. In most coal mines, room props and mine ties constitute the two chief items of timbering. Further information on salvaging mine timber will be found Bureau of Mines Bulletin 235, recently issued.

## Mines Faculty Appointments

Three graduates of the Colorado School of Mines have been appointed to the faculty of the institution by the board of trustees. Edward C. Krekle, '26, was named instructor in chemistry; George MacHamer, '22, instructor in geology, and Monty Budd, '24, was appointed director of publications.

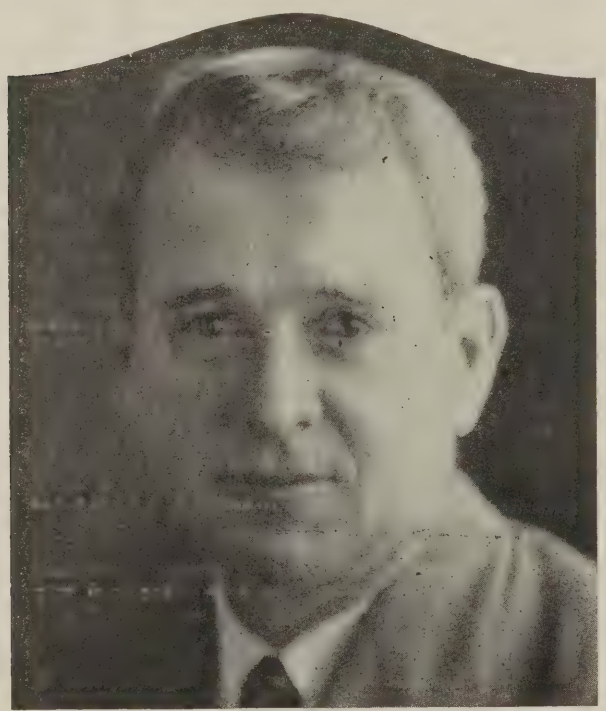
# PERSONAL NOTES

**William D. Waltman, '99,** is now with the Urbain Corporation, 292 Madison Ave., New York City.

**Harry J. Wolf, '03,** announces the organization of H. J. Wolf Inc., "for the purpose of employment of savings under conditions which offer a high degree of safety for the original capital, a fair investment return, and an additional speculative profit as high as may be consistent with a limited risk." According the the prospectus, the organization will pool the moneys it receives, making systematic investments based on market judgment and statistics. The plan in detail will no doubt be more amply explained by Mr. Wolf, who may be addressed at 42 Broadway, New York City.

**H. J. Wallace, '04** was in Golden recently visiting old friends at the school in company with **Arthur Hewitt,** of Denver. Wallace is superintendent of construction of Forest Lawn Memorial park, Hollywood, Calif.

**Joseph F. O'Byrne, '05,** is treading the air these days. The 1927 Prospector, school year book, was dedicated to him. Congratulations Joe.



JOSEPH O'BYRNE, '05

**Max Ball, '06,** accompanied by **Hal Cronin, '26,** recently made a flying trip to Salt Creek fields in Cronin's ship.

**J. A. Weir, '09,** now with the New Mexico School of Mines, sends best wishes to all his friends and hopes that everything is going well at Golden. Said message arrived with John's check for dues and Magazine another year.

**W. J. Ailinger, '13,** may be addressed at 4420 West 43rd Ave., Denver, Colo.

**Wm. D. Peregrine '13,** has changed his address to Box 78, Telluride, Colo., having moved from Smuggler, Colo.

**Fred Tyler '22,** is located at 1135 West Platinum St., Butte, Mont.

**William McGill, '22, is** employed as a geologist by the Marland Oil Co., Denver.

**John Yates, '23,** instructor of descriptive geometry and mathematics at Washington University, St. Louis, Mo., was a recent Golden visitor.

**Carl Linderholm, '24,** has returned to Colorado after resigning his position as assistant engineer with the Texas Gulf Sulphur Co.

**Francisco Joaquin, '26,** leaves shortly for Manila where he will be located at 1013 Croquieta.

**Wayne Denning, '26,** and **Merle Dannettelle, '23,** are in Utah, doing geological work for the Midwest Refining Co.

**Charles Bynum, '26,** has accepted a position as geologist with the Texas Co.

## "Stew" Henderson Killed

**James Stewart Henderson '23,** known as one of the best slabmen the baseball team ever boasted, was killed at Butte, Montana, June 1st, when he was caught in a cavein in the Colusa mine, part of the Anaconda properties. Henderson was in charge of the shift and had just inspected a slope working, when the cavein occurred. He was buried under hundreds of tons of rock and timber with two miners. The bodies were recovered in 36 hours.

Henderson was 27 years of age, was born in Montrose, and lived there before entering Mines. He belonged to Sigma Alpha Epsilon and Theta Tau. As a pitcher, few conference hurlers have surpassed his performances. He was practically invincible on the mound and played a stellar role with the nine for four years.

Funeral services were held June 9 at Montrose, with a number of Mines men attending.

"Stew" had scores of friends in the ranks of the alumni who will be grieved to hear of his death. His likeable personality will be remembered by all who knew him.

## "Stew" McKelvie Killed

**Stewart McKelvie, ex-24,** was killed in an automobile accident near New York City June 14. Details are not available. He was a member of Beta Theta Pi.

### COMMISSIONS AWARDED

(Continued from page 6)

Desgrey, Max W. Dessau, Robert C. Diehl, Robert J. Dunbar, Jack Greenspoon, Kenneth E. Hickok, Feral H. Johnson, William H. King, George W. LaMaire, Dell E. Litz, Jack A. Martin, Maxwell L. McCormack, B. A. Miller, Milward Miller, Jewel Eathen Morrison, William J. Neimi, Arthur L. O'Toole, Oran L. Pack, Clifford O. Rolston, Melford H. Salsbury, George L. Shue, Glenn Leroy Shepherd, Robley F. Sopris, Archibald A. Sproul, George W. Thomas, Russell H. Volk, Phineas Washer, Gaylord C. Weaver, Neil H. Wills and Edgar P. Evans.

### THE DIVINE RIGHT OF ALUMNI

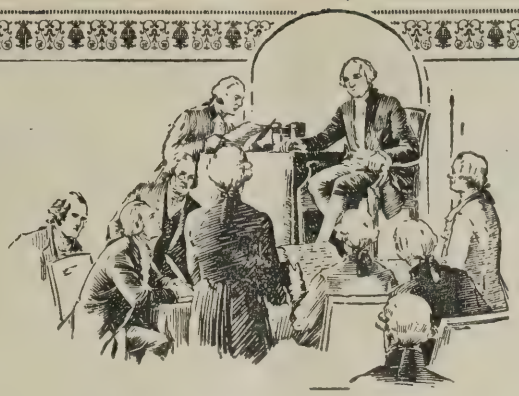
(Continued from Page 14)

"You?" said I. "What right have you to do it?"

Ruggles opened his mouth to answer me. Then he caught my eye and grinned. "You're right," he said. "Funny how it gets into one's blood?"

*CHAMPION*

*By defating Prof. Hurlbut of Colorado College on the last hole, Prof. W. J. Risley of Mines again annexed the Rocky Mountain Conference faculty golf championship. Here's how he looks in action.*



# Federation

"TO form a more perfect union" was the animating thought of the statesmen who met to draft America's constitution. Their problem was to weld the sections they represented into a political entity that would function most efficiently and enduringly in the service of the people.

A similar problem was presented nearly a century later to the organizers of America's telephone service. Licenses under the first patents were being granted to isolated companies that were forming to introduce local service. "A more perfect union" of these companies seemed, from the beginning of the telephone's adoption by the people, to be essential, and so the structure of the Bell System was planned.

This organization exists today substantially as it was then conceived, – a group of companies, each preserving its individuality and applying local knowledge to local needs, but all federated into a single cohesive union in order that nation-wide, universal service may be provided.

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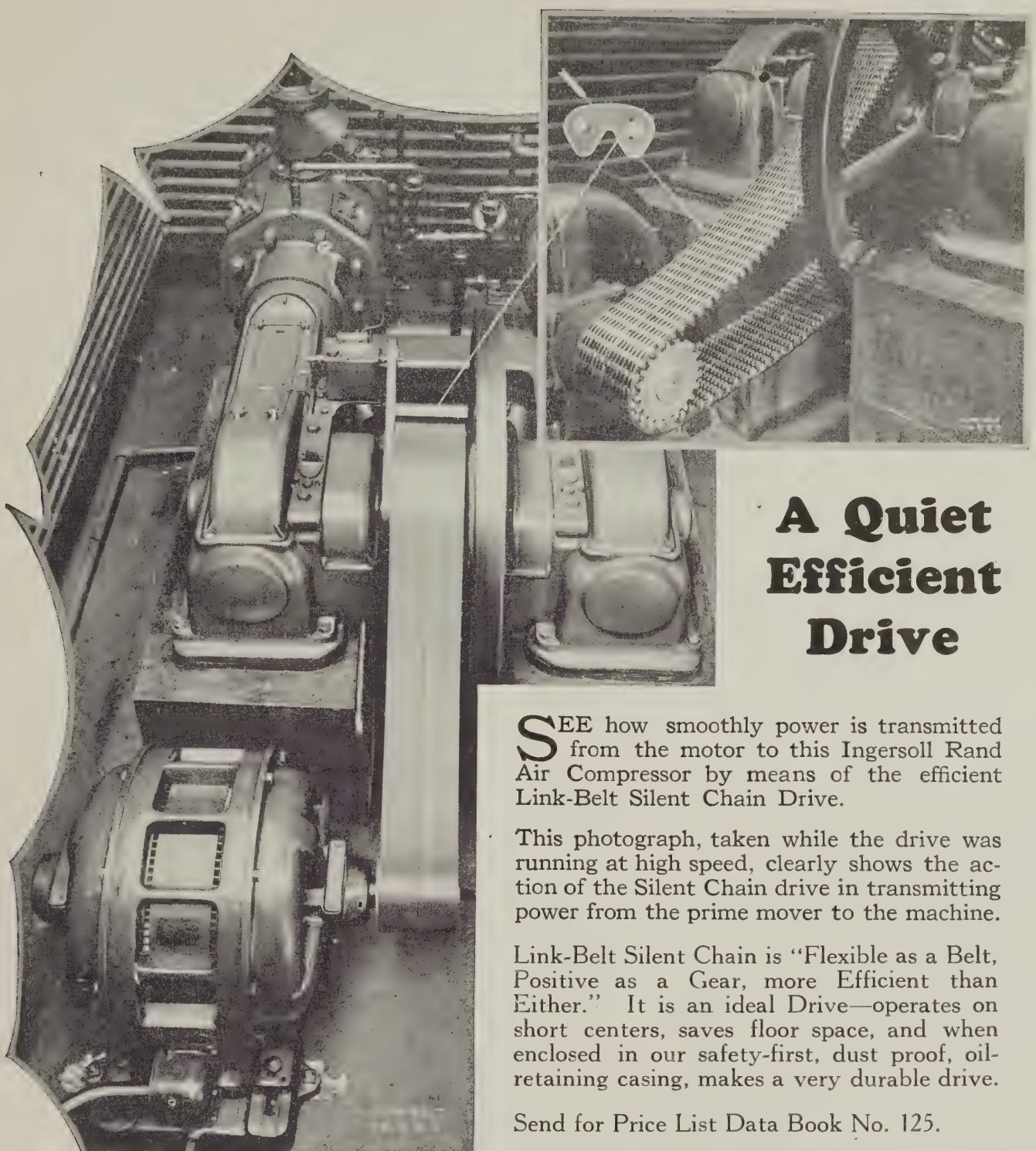

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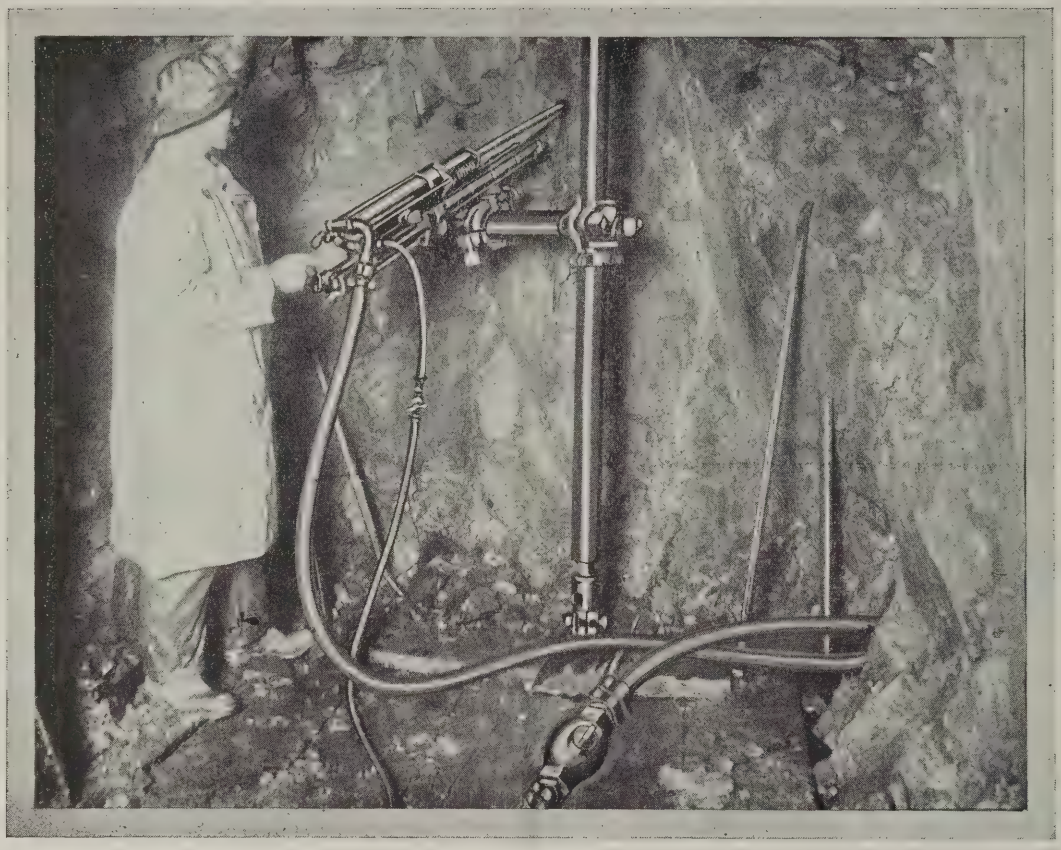

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# THE COLORADO SCHOOL OF MINES MAGAZINE



**JULY - 1926**

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The

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M. R. (MONTY) BUDD, '24, Editor

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VOLUME XVI — JULY, 1926 — NUMBER 3

# CONTENTS



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# Constitution and By-Laws

*Of the Association of Alumni of The Colorado School of Mines;*
*Annual Publication is Required*
*According to Law*

## CONSTITUTION

### ARTICLE I
Name and Object

Section 1. The name of this Association shall be "The Association of the Alumni of the Colorado School of Mines."

Sec. 2. The object shall be, the cultivation of friendship, acquaintance, mutual aid, and the elevation of the reputation and standard of the Alma Mater.

### ARTICLE II

Section 1. Any person holding a degree from the Colorado School of Mines may become a member upon the payment of the initiation fee to the Treasurer.

Sec. 2. All members must be of good moral character and in good standing professionally.

### ARTICLE III

Section 1. There shall be a President, a Vice-President, a Secretary, and a Treasurer. There shall also be an Executive Committee, consisting of the above officers, and three other members.

Election

Sec. 2. The President, Vice-President, Secretary and Treasurer shall be elected at regular annual meetings, for a term of one year and the three remaining members of the Executive Committee as follows, viz: One for three years, one for two years, and one for one year, and thereafter these members, shall be elected for a term of three years. Vacancies occuring during the year shall be filled by the Executive Committee.

### ARTICLE IV
Meetings

Section 1. Regular annual meetings shall be held each year, on the day following the commencement exercises, unless otherwise provided by the Executive Committee.

### ARTICLE V
Emergency Clause

Section 1. This Constitution may be changed or amended by a two-thirds vote of all votes cast on the question, personally or by letter, provided that notice of change or amendment shall have been sent to every member whose address is known, at least one month before the counting of the votes. The Secretary may collect votes by letter, and the votes shall be canvassed by the Executive Committee.

Sec. 2. A proposed amendment to the Constitution shall be submitted to the Associatiion in the following manner:

A petition containing the proposed amendment in full ann signed by at least fifty (50) members of the Association shall be sent to the Assistant Secretary for publication in the Colorado School of Mines Magazine at least one month before the ballots are cast.

The Assistant Secretary will publish the petition in full and arguments submitted by members for or against the proposed amendment.

The proposed amendment will be submitted to the Association for a vote on the regular annual ballot unless the Executive Committee deems it advisable to order the amendment submitted at a special election.

## BY-LAWS

### ARTICLE I
Rules of Order

Section 1. The meetings of this Association shall be governed by Roberts' Rules of Order, except where the same conflict with the Constitution and By-Laws of this Association.

### ARTICLE II
Quorum

Section 1. A quorum shall consist of twenty members, who may be represented by proxy, provided that at least ten members are present in person.

### ARTICLE III
Duties of Officers

Section 1. Duties of President:

The duties of the President shall be to preside at all meetings, announce business, put all motions, decide tie votes on questions of order, and appoint Local Committees. He shall also be chairman of the Executive Committee.

Sec. 2. Duties of the Vice-President:

The duties of the Vice-President shall be that of President in his absence or inability to act.

Sec. 3. Duties of Secretary:

The Secretary shall keep a record of the proceedings of the Association and shall publish and distribute an annual pamphlet containing the Constitution and By-Laws, his report, the report of the Treasurer, the report of the Standing Committee, together with a list of the officers and members of the Association, and any other papers of interest to the Alumni.

The Secretary shall, upon the presentation of a proper bill, make out a regular numbered voucher or warrant on the Treasurer, for the necessary amount. In case of dispute in regard to a bill presented for payment it shall be referred to the Executive Committee.

Sec. 4. Duties of Treasurer:

The Treasurer shall collect all dues and take charge of all moneys. He shall keep a record of the finances of the Association and shall make a report to the Association at its annual meeting. This report shall also be delivered to the Secreaary for publication in the annual pamphlet. The Treasurer shall pay out money only when a regular voucher or warrent bearing the signature of the Secretary, is presented. In case of dispute in regard to paying a bill, it shall be referred to the Executive Committee.

Sec. 5. Duties of the Executive Committee:

The Executive Committee shall elect the Standing Committee, audit the Treasurer's report, act as final authority in determining the expenses of the Association, and arrange for annual dinners.

The Executive Committee may call special meetings of the Association when it is deemed necessary, and may employ an assistant secretary and assistant treasurer at Golden to act as manager of the Capability Exchange, managing editor of the Colorado School of Mines Magazine, and fulfill the duties of the Secretary and Treasurer as provided for in Sections 3 and 4 of this Article, under such restrictions as the Executive Committee may impose. While an assistant secretary and treasurer is employed the Secretary and Treasurer shall act as auditors and examine and audit the books, accounts and reports of the assistant secretary and treasurer at least once a year, certify to the accounts and reports, if found correct, and report the result of their examination to the Executive Committee.

The Colorado School of Mines Magazine will be the official organ of the Association, and in it will be printed the reports provided for in the By-Laws as they may be submitted. The number containing the annual reports of the Secretary and Treasurer will also contain the Constitution and By-Laws of the Association, and will be considered as the annual pamphlet provided for in Section 3 of this Article.

The Executive Committee shall have full control of the assistant secretary and treasurer, and decide all fundamental points in the conduct of the Colorado School of Mines Magazine and the Capability Exchange.

### ARTICLE IV
Election of Officers

Section 1. The officers of the Association shall be elected by a majority of all votes cast. Votes must be cast either by ballot or by letter.

### ARTICLE V

Section 1. Special meetings shall be called as provided for in Article III, Section 5, of the By-Laws, or by petition signed by at least ten members.

### ARTICLE VI
Annual Dinners

Section 1. The Annual Dinner shall be held on the same date as the Annual Meeting, unless otherwise provided

by the Executive Committee.

ARTICLE VII

Initiation Fees and Dues

Section 1. Initiation Fees: The initiation fee of this Association shall be fifty cents.

Sec. 2. The dues shall be one dollar and fifty cents ($1.50) per calendar year, payable to the Treasurer of the Association, before the first day of June.

Notice of dues shall be sent to each member, whose address is known, on or before the first day of February, and if the dues of any member shall remain unpaid by the last day of April a second notice shall be sent him, and if such dues remain unpaid on June 1st, his name shall be stricken from the roll and he shall not be considered in good standing.

Should he desire to again become a member, he may do so upon payment of the initiation fee and the dues for the current year.

A new graduate of the Colorado School of Mines may become a member of the Association any time during the first six months after receiving his degree, upon the payment of the initiation fee and seventy-five (75) cents as dues for the remainder of that calendar year, unless the graduate was, as an undergraduate, registered with the Capability Exchange, in which case his registration fee will be credited upon graduation as initiation fee and dues for that year.

Sec. 3. A life membership in the Association may be obtained by any member in good standing upon paying to the Treasurer the sum of fifteen dollars ($15.00) and by maintaining the good moral character and professional standing of ordinary members.

ARTICLE VIII

Standing Committee

Section 1. There shall be the following standing committees: Committee on nominations, Committee on Athletics, and Committee on Instruction.

Sec. 2. The Committee on Nominations shall consist of five members, not officers of the Association, whose duty shall be to receive nominations from members for President, Vice-President, Secretary and Treasurer, and for members of the Executive Committee, and announce the same by written notices to each member one month before the annual meeting.

Sec. 3. The Committee on Athletics shall consist of five members, whose duty shall be to keep a record of proceedings of the athletics of the Alma Mater, and encourage the same when in their power.

Sec. 4. The Committee of Instruction shall consist of five members, whose duty shall be to investigate the course of study followed at the Colorado School of Mines, and make a report of the same at the annual meeting of the Association.

ARTICLE IX

Emergency Clause

Section 1. These By-Laws may be changed or amended by a two-thirds vote of all votes cast on the question, either personally or by letter, provided that notice of the change or amendment shall have been sent to every member, whose address is known, at least one month before the counting of the votes. The Secretary may collect votes by letter, and the vote shall be canvassed by the Executive Committee.

Sec. 2. A proposed amendment to the By-Laws shall be submitted to the Association in the following manner:

A petition containing the proposed amendment in full and signed by at least fifty (50) members of the Association shall be sent to the Assistant Secretary for publication in the Colorado School of Mines Magazine at least one month before the ballots are cast.

The Assistant Secretary will publish the petition in full and arguments submitted by members for or against the proposed amendment.

The propesed amendment will be submitted to the Association for a vote on the regular ballot unless the Executive Committee deems it advisable to order the amendment submitted at a special election.

# The Colorao School of Mines Alumni Association

## Financial Statement

1925

RECEIPTS

| | | |
|---|---|---|
| Cash on Hand, Jan. 1, 1925 | $ | 230.33 |
| Magazine Subscriptions | | 355.35 |
| Association Dues | | 287.00 |
| Advertising Income | | 2,335.50 |
| TOTAL | $ | 3,208.18 |

DISBURSEMENTS

| | | |
|---|---|---|
| Salary | $ | 1,020.00 |
| Clerical Help | | 157.00 |
| Publishing Magazine | | 1,716.11 |
| Association Expense | | 88.24 |
| TOTAL | $ | 2,981.35 |

RECONCILIATION

| | | |
|---|---|---|
| Total Cash Received | $ | 3,208.18 |
| Total Cash Disbursements | | 2,981.35 |
| | $ | 226.83 |
| Balance Rubey National Bank, January 1, 1926 | $ | 226.83 |

Respectfully Submitted,

MONTY BUDD,

# Mines Alumni Directory

*First of Two Addresses is Permanent or Home Address; If There Are Any Corrections or Additions Inform the Assistant Secretary*

## A

Aaron, Eugene Randolph, E. M. 1922. (3533 West 58th Place, Los Angeles, California.) Engr. Hughes Tool Company, 2445 Enterprise St., Los Angeles, California.

Abadilla, Quirico Abello, E. M. 1920. (Catanawan, Tayabas, P. I.) Lago Petroleum Corporation, Maracaiba, Venezuela.

Abel, Walter D., E. M. 1906. (1615 West 24th St., Los Angeles, California.) Chief Engr., State Corporation Department, 1003 Pacific Finance Bldg., Los Angeles, California.

Adami, Charles J., E. M., 1899. (902 North Park Ave., Helena, Montana.) Gen. Mgr., St. Joseph Lead Company, Bonne Terre, Missouri.

Adams, Charles, E. M. 1904. (3807 West 59th St., Los Angeles, California.) Right of Way & Tax Agent, Union Pacific System, 601 Pacific Electric Bldg., Los Angeles, Calif.

Adams, James Vernon, E. M. 1923. (600 West Seventh St., Taylor, Texas.) Geologist, Humble Oil & Refining Co., Pecos, Texas.

Adams, Warren, P. E. 1925. (Kensington, Maryland.) c|o Sun City Holding Co., Bradentown, Florida.

Adams, Wilber Edward, E. M. 1900. Deceased.

Adamsan, John Nicholson, E. M. 1921.

Ailinger, Walter J., E. M. 1913. 4420 W. 43rd Ave., Denver, Colo.

Albi, Charles, E. M. 1918.

Aldrich, Harold Wallace, E .M. 1906. (Box 243, Inspiration, Arizona.) Asst. Gen. Supt. Inspiration Consolidated Copper Co., Inspiration, Arizona.

Alenius, Eskil Milburn Johannes, E. M. 1923. (545 Washington St., Denver, Colorado.) Asst. Engr., United Verde Copper Company, Box 1604, Jerome, Arizona.

Allan, Rex John, E. M. 1922. (212 East Second St., Grand Island, Nebraska.) Project Engr., Dept. Public Works, State of Nebraska, Grand Island, Nebraska.

Allan, Thomas H., E. M. 1918. Box 362, Russell, Kansas.

Allen, Carl A., E. M. 1905. Deceased.

Allen, Maynard Coney, E. M. 1906. (P. O. Box 142, Inspiration, Arizona.) Mechanical Engineer, Inspiration Consolidated Copper Company, Inspiration, Arizona.

Aller, Frank D., E. M. 1892. Metallurgist, A. S. & R. Co., Box 867, Leadville, Colo.

Alvir, Antonio Delgado, E. M. 1920. (619 Kansas Ave., Manila, P. I.) Geologist & Mining Engineer, Bureau of Science, Manila, P. I.

Ambrosius, Carl E., E. M. 1888. Guanacevi, Dgo, Mexico.

Amsden, Burton Francis, E. M. 1925. (612 Lafayette St., Denver, Colorado.)

Anderson, Axel E., E. M. 1904. (943 Downing St., Denver, Colorado.) Technical Representative, E. I. DuPont de Nemours & Co., 406 Ideal Bldg., Denver, Colorado.

Anderson, Neil A., E. M., 1902.

Anderson, Ray B., E. M. 1918. (Waldo Ave., Bayside, Long Island, New York.) Geol. Louisville Gas & Electric Co., 311 W. Chastnut St., Louisville, Ky.

Andre, Morris V., Jr., E. M. 1911. Supt. Converter Dept., American Smelting & Refining Company, Garfield, Utar.

Andrews, Earl D., E. M. 1912.

Andrews, Thaddeus H., E. M. 1917.

Arfsten, George J., E. M. 1913. 4844 Newton St., Denver, Colorado.

Armington, H. C., E. M. 1907. (2211 Loma Vista, Los Angeles, California.) Supt., L. S. Finch Chemical Company, R. F. D. 2, Los Angeles, California.

Arthur, Charles S., E. M. 1915. (1653 High St., Denver, Colorado.) Asst. to Insurance Manager, Great Western Sugar Company, Sugar Bldg., Denver, Colorado.

Arthur, Edward P. Jr., E. M. 1895. Mining Engineer & Surveyor, Cripple Creek, Colorado.

Atchison, Lowell Chrysler, Chem. Engr. 1925. (1115 South High St., Denver, Colorado.)

Atkins, Horace H., E. M. 1894. (211 South 12th St., Muskogee, Oklahoma.) Local Manager, The Prairie Oil & Gas Co., 723 Exchange National Bank Bldg., Muskogee, Oklahoma.

Atkinson, Walter J., C. E. 1896.

Atwater, Maxwell W., E. M. 1901. Deceased.

Austin, Arthur, E. M. 1905. Deceased.

## B

Bacca, Joseph Paul, E. M. 1922. (605 Pine St., Trinidad, Colorado.) City Engineer, Trinidad, Colorado.

Badger, Herbert E., E. M. 1902. (Scranton, North Dakota.) Secy. & Mgr., Buffalo Creek Coal Company, Scranton, North Dakota.

Badgley, Charles Welling, E. M. 1906. Asst. Division Supt. St. Joseph Lead Company, Herculanenm, Missouri.

Baekeland, George Washington, E. M. 1922. (Snug Rock, Yankers, New York.) Director, Baeklite Corporation, 247 Park Ave., New York, N. Y.

Bailey, Donald Lewis, E. M. 1921. (1821 East Fifth St., Long Beach, California.) Engr., J. D. Rockhold, County Surveyor, Hall of Records, Los Angeles, California.

Bailey, E. W., E. M. 1905. Fallon, Nevada.

Baker, Erwin F., E. M. 1914. (2917 Vine St., Denver, Colorado.)

Baker, Hamilton W., E. M. 1911. Cr. Plimpton & Plimpton, 200 Devonshire Street, Boston, Mass.

Baldwin, Harry Lewis, P. E. 1925. (Bartlesville, Oklahoma.) c|o Marland Oil Co. of Colorado, Box 1169, Denver, Colorado.

Baldwin, James Watson, E. M. 1921. (Box 225, Bartlesville, Oklahoma.) Budget Dept. Empire Gas & Fuel Company, Bartlesville, Oklahoma.

Ball, Byron E. E. M. 1913.

Ball, Louis R., E. M. 1900. c|o Edwin Ball, T. C. I. & R. R. Co., Birmingham, Ala. Consulting Mining & Metallurgical Engineer, 1204 Pine St., South Pasadena, California.

Ball, Max Waite, E. M. 1906. (2277 Bellaire St., Denver, Colorado.) Pres. Argo Oil Co., 1104 First National Bank Bldg., Denver, Colorado.

Ballagh, J. Courtenay, E. M. Met. 1910. El Paso, Texas.

Ballard, James Logan, P. E. 1925. (208 Summit Circle French Lick, Indiana.) 400 Riverside Drive, Apt. 4 D, New York, N. Y.

Banks, Leon M., E. M. 1912. Supt. Tecopa Cons. Mining Co., Tecopa, California.

Banks, Paul Wesley, P. E. 1925. (Cr. C. C. Fuson, Milliken, Colorado.)

Barb, Clark Fred, P. E. 1925. (1427 East St., Golden, Colorado.) Instructor in Petroleum Engineering, Colorado School of Mines, Golden, Colorado.

Barbour, Percy P., E. M. 1898. Georgetown, Colorado.

Barenscheer, William J., E. M. 1896.

Barker, Franklin Luther, E. M. 1906. Deceased.

Barker, Pierce, E. Met. 1907. 155-C Delevar-Morris Apts., Germantown, Philadelphia, Pa.

Barlow, Cecil Bristol P. E. 1923. (Eau Claire, Michigan.) Efficiency Engineering Dept., The Texas Company, 719 South McKinley St., Casper, Wyoming.

Barnes, Corrin, E. M. 1896. Goldfield Deep Mines, Goldfield, Nevada.

Barnett, Walter W., E. M. 1911. (636 Josephine St., Denver, Colorado.) Box 183, Nome Alaska.

Barney, H. A., E. M. 1914.

Baroch, Charles Thomas, E. M. 1923. (4340 Alcott St., Denver, Colorado.) Heating & Ventilation Engineer, O'Fallen-Crane Co., 1621 15th St., Denver, Colorado.

Barnett, Morris Karlynn, E. M. 1924. Geologist, Marland Oil Co., Houston, Texas.

Barron, Chauncey T., E. M. 1902. Mgr. Norfolk Smelting Company, Inc., West Norfolk, Virginia.

Bartholomew, Tracy, E. M. 1906. 47710 Waverly St., Pittsburgh, Pa.) Senior Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa.

Basso, Charles Edward, P. E. 1925. (66 Post St., Yonkers, New York.) Lubrication Engineer, The Texas Co., 332 South Michigan Ave., Chicago, Illinois.

Bastanchury, G. A., E. M. 1907. Fullerton, California.

Baxter, Robert A., M. S. 1923. (423 Sixteenth St., Golden, Colorado.) Asst. Prof. Chemistry, Colorado School of Mines, Golden, Colorado.

Bayless, Benjamin Donoho, P. E. 1924. (Greenwood Inn, Evanston, Illinois.)

Beall, Alpheus Benjamin Jr., E. M. 1915.

Bebee, Alfred Henry, E. M. 1915. Supt. Vindicater U. G. M. Co., Mine, Independence, Colorado.

Beck, August Felix, E. M. 1925. (3441 Shenandoah Ave., St. Louis, Mo.) Box 2045, Tulsa, Oklahoma.

Beck, Daniel L., E. M. 1912. 477 79th St., Brooklyn, N. Y.

Beck, William Adolph Jr., E. M. 1923. (1010 South 18th St., Birmingham, Alabama.) Division Engr., Tennessee Coal, Iron & R. R. Co., Ishkooda Mines, R. R. 1, Birmingham, Alabama.

Beck, W. Lloyd, E. M. 1914. (40 Corona St., Denver, Colorado.) Sales Engr., The Denver Rock Drill Mfg. Co., 825 West Washington Blvd., Chicago, Illinois. (5606 Fulton St., Chicago, Illinois.)

Beech, C. L., E. M. 1926. (Stuart, Iowa.)

Beeler, Henry C., E. M. 1896. Consulting Geologist, 1631 Race St., Denver, Colorado.

Beeth, Clarence Donald, E. M. 1924. (Tucumcari, New Mexico.) Instrument Man, Marland Oil Company of Colorado, Denver, Colorado.

Beilharz, Carl Frichot, Geol. Engr. 1925. (2723 Swiss Ave., Dallas, Texas.)

Bell, Charles Norman, E. M. 1906. (1445 Birch Street, Denver, Colorado.) Asst. Mgr., Colorado Department, Metals Exploration Company, 829 Symes Bldg., Denver, Colorado.

Bell, Francis Millen, E. M. 1921. c|o W. C. Bell, Palisades, Colorado.

Bellam, Henry L., B. S. 1889. Assayer, Box 689, Reno, Nevada.

Belleau, Floyd Mayes, E. Met. 1923. (White Hills, Arizona.) Engr., White Hills Mining Company, White Hills, Arizona.

Benbow, Jules Coleman, E. M. 1920. (1600 Cheyenne Road, Colorado Springs, Colorado.) Foreman, Nevada Con. Copper Co., Box 317, Ruth, Nevada.

Bender, Martin S., Geol. Engr. 1926. (1426 N. Canal Street, Sharpsburg, Penn.)

Bengzon, Ernesto Cabrera, E. M. 1921. (Camilac, Tarlac, P. I.) Anaconda Copper Mining Company, Great Falls, Mont.

Benjamin, Milton Jacob, E. Met. 1925.

Benjovsky, Theodore, D., E. M. 1909. (Del Norte, Colorado.) Mining Engineer, 227 Teller Street, Salida, Colorado.

Benner, Howard C. E. M. 1913. (Leader-News Bldg., Cleveland, Ohio.) Asst. Foreman, Butte & Superior Mining Company, 927 Calendonia Street, Butte, Montana.

Bennett, Charles Doerr, E. Met. 1925. (810 Fedora Street, Los Angeles, California.) Ingersoll-Rand Co., Phillipsburg, New Jersey.

Benwell, George A. Jr., E. M. 1900. Deceased.

Bergh, John Evans, E. M. 1902.

Berkovitz, Sam, E. M. 1920. (1216 Spruce Street, Pueblo, Colorado.) Asst. Engr., The Colorado Fuel & Iron Co., 510 Bank Bldg., Trinidad, Colorado.

Berner, Vernon Theodore, E. M. 1925. (Box 62, Ray, Arizona.) Ray Consolidated Copper Co., Ray, Arizona.

Berry, Albert, E. M. 1905. Brewster, Washington.

Berry, William James, E. Met. 1924. (18 Seaton Place, N. W., Washington, D. C.) Instructor in Mathematics, University of Colorado, Boulder, Colorado.

Berthier, Ulysses Henry, E. M. 1916. Supt. Monterrey Smelter, Cia Minera de Penoles, S. A., P. O. Box 251, Monterrey, N. L., Mexico.

Berthoud, Capt. E. L., Hon. 1903. Deceased.

Bertschey, Perry H., E. M. 1898.

Bevan, John G., E. M. 1921. (1612 North Corona St., Colorado Springs, Colorado.)

Bicknell, Harold Lewis, E. M. 1916. 232 South East Ave., Oak Park, Illinois.

Bigley, Arthur C., E. M. 1913. (206 Mueller Apt., Butte, Montana.) Asst. Foreman, West Colusa Mine, Anacando Mining Company, Butte, Montana.

Bilheimer, Earl Leo, E. M. 1922. (Cr. Mrs. F. J. Green 149 Gilpin St., Denver, Colorado.) St. Joe Lead Company,, Box 177, Bonne Terre, Missouri.
Bilisoly, Joseph Moniz, E. M. 1923. (607 Fourteenth St., Golden, Colorado.) Engr., Sales Staff, The Dorr Company, 824 Cooper, Bldg., Denver, Colorado.
Billyard, John R. H. H., E. M. 1913. Consulting Engineer, Casilla 866, Valparaiso, Chile, S. A.
Binyon, Eugene Orrick, E. M. 1923. (903 Bronard Street, Houston, Texas.) Engineer & Assayer, C. & A. Mining Co., Valedon, New Mexico.
Bishop, Raymond, E. M. 1901. Deceased.
Bisland, John B., E. M. 1913. Deceased.
Blackburn, Ward W., E. M. 1908. Ingersoll-Rand Company. 601 Riggins Bldg., Los Angeles, California.
Blaurock, Carl Albert, E. M. 1916. (1526½ Champa St., Denver, Colorado.)
Blickenstaff, Earl Bates, E. M. 1925. (Box 505, Oberlin, Kansas.) Chief Consolidated Mining Co., Eureka, Utah.
Bliss, Paul Dayton, E. Met. 1926. (600 11th St., Corning, Iowa. Colo. Fuel & Iron Co., Pueblo, Colo.
Block, Gary E., E. M. 1908. (605 West Euclid Ave., Pittsburg, Kansas.) Gen. Mgr. Ellsworth Coal Company, 315 Globe Bldg., Pittsburg, Kansas.
Blow, A. A. Hon. 1910. Deceased.
Blum, Sidney, E. Met. 1911. (155 N. Jefferson St., Los Angeles, California.) Sales Engineer Dept., Gordon-Harrison Russell Inc., Pueblo, Colorado.
Blumenthal, Emil E., E. M. 1898. Chemist & Manager, Montana Laboratory Company, Philipsburg, Montana.
Boatright, Byron Blackburn, E. M. 1922. (Mid West, Wyoming.) Tool Dresser, Midwest Refining Company, Mid West, Wyoming.
Boeke, Charles Leslie, E. M. 1920. (Lena, Illinois.) Capitan Blanco No. 1, Porral, Chih. Mexico.
Bolam, Albert Earl, E. M. 1915.
Bonardi, John P., E. M. 1921. Sales Mgr., The Mine & Smelter Supply Co. 42 Broadway, New York, N. Y.
Bond, Fred Chester, E. M. 1922, M. S. 1926. (500 Eighteenth St., Golden, Colorado.) Instructor in Chemistry, Colorado School of Mines, Golden, Colorado.
Bowen, Max W., E. M. 1924. Chemist, Portland Gold Mining Co., Victor, Colorado.
Bowhay, Arnold A. Jr., E. M. 1914. (121 South Lincoln St., Santa Maria, California.) Principal, Santa Maria Union High School, and Dean, Junior College, Santa Maria, California.
Bowie, James W., E. M. Deceased.
Bowman, Frank C., E. M. 1901. (2960 Dahlia St., Denver, Colorado.) Consulting Engineer, 427 Seventeenth St., Denver, Colorado.
Bowman, Reginald G., E. Met. 1911. Asst. Supt. International Lead Refining Company, East Chicago, Illinois.
Boyd, Arch Frank, E. M. 1926. Gold Hill, Colorado.
Boyd, Jesse T., E. M. 1908. (11312 Hessler Road, Cleveland, Ohio.) The Mexican Corporation, Aire Libre, Pueblo, Mexico.
Boyle, Willis J. Jr., E. M. 1912. (1657 Wilshire Blvd., Los Angeles, California.) Treas., Boyle Manufacturing Co. Inc., 5100 Santa Fe Ave., Los Angeles, California.
Bradford, Albert H. E. M. 1909. (Placentia, Orange County, California.) Gen. Mgr. West Coast Refining & Oil Co., Los Angeles, California, 620 Pacific Finance Bldg.
Bradford, Julius S., E. M. 1910. (P. O. Box 161, Fullerton, California.) Secy. Treas., Chiksan Oil Company, Fullerton, California.
Bradley, Joseph M., E. M. 1901. (R. R. 2, Box 92, Arvada, Colorado.)
Braudow, Glenn A., E. M. 1915. (69 West Gibson St., Canadaigua, New York.) Box 1476, Denver, Colorado.
Brandt, A. R., E. M. 1907. 820 Elati St., Denver, Colorado.
Breckenridge, Leland Davis, E. M. 1921.
Breed, Charles Francis, E. M. 1901.
Bregman, Adolph, E. M. 1914. (660 Riverside Drive, New York, N. Y.) Mgr., Editor The Metal Industry, 99 John St., New York, N. Y.
Brennan, Robert Joseph, E. M. 1926. Pottsville, Penn.
Brenneman, Frederick C., E. M. 1916. Deceased.
Brewer, Quenton Lucius, Geol. Engr. 1926. (633 Mathews St., Fort Collins, Colorado.) c|o C. F. & I. Co., Pueblo, Colorado.
Briber, Frank Edward, E. M. 1916. (440 South Ogden St., Denver, Colorado.) Stearns-Roger Mfg. Co., Denver, Colorado.
Brinker, Albert W., E. M. 1908. Deceased.
Brinker, Arthur C., E. M. 1901. Engineer Gold Mines Ltd. Engineer, B. C., Canada.
Brinker, Fred A., E. M. 1921. (691 South Washington St., Denver, Colorado.)
Bronstein, Charles N., E. M. 1912.
Brook, Charles Chester, E. M. 1923. (1313 High Street, Bellingham, Washington.) Asst. Engr., City of Beverly Hills, 966 South Hoover St., Los Angeles, California.
Brook, Edward Joseph, E. M. 1923. (1315 High St., Bellingham, Washington.) Junior Engr., County Surveyor, 966 South Hoover St., Los Angeles, California.
Brooke, Lionel, E. M. 1914.
Brooks, Eugene C., E. M. 1910. Engineer J. T. Slack Corporation, Springfield, Vermont.
Brousseau, Andre Ringgold, E. M. 1914. Construction Engineer, Jos. Fromherz, Inc. 507 Title Guarantee Bldg., New Orleans, La.
Brown, C. Leroy, E. M. 1908.
Brown, Firman Hewitt, E. M. 1924. (320 Jefferson St., Brookville, Pennsylvania.) Civil Engineer, F. K. Webb & Co., Inc., Bradentown, Florida.
Brown, LeRoy Tyler, E. M. 1926. (95 West 133d St., New York City.) Cerro de Passe Copper Co., Jr. Engr., Cino de Paseo, Peru.
Brown, Frank A., E. M. 1921. Credit Man, Ingersoll-Rand Company, 834 Higgins Bldg., Los Angeles, California.
Brown, John Briscoe, E. M. 1906. Cia Transcontinental de Petrolea, Apartado 6, Puerto Mexico, Ver., Mexico.
Brown, Norton H. E. M., 1892. 2830 Williams Street, Denver, Colorado.
Brown, Prentice Farrar, E. M. 1920. (426 East 14th Ave., Denver, Colorado.) Geologist, Fisher & Lowrie, 711 First lNationa Bank Bldg., Denver, Colorado.
Brown, R. L., E. M. 1905.
Brown, Samuel R. Jr., E. M. 1911. (Box 246, Montrose, Colorado.) Asst. Gen. Mgr., San Francisco Mines of Mexico, Ltd., Apt. 48, Parral, Chihuahua, Mexico.
Brown, Walter R., E. M. 1910. (Box 377, Ruth, Nevada.) Chief Engr., Mining Dept., Neveda Consolidated Copper Company, Ruth, Nevada.
Brown, William Horatio, Jr., E. M. 1921. (1004 Floyd Ave., Richmond, Virginia.) Instructor in Geology, University of Arizona, Tuscon, Arizona.
Bruce, Harry F., E. M. 1900. Tonopah, Nevada.
Bruce, James L., E. M. 1901. Cyprus Mines, Corporation, Skouriofissa, Nic osia, Cyprus.
Bruce, Stuart S., E. M. 1899. (Cr. Stuart Bruce, 204 Woolworth Bldg., Victoria, B. C., Canada.) Mechanical Engr., Dept., St. Joseph Lead Co., Bonne Terre, Missouri.
Bruderlin, Emil J., E. Met. 1910. (1276 Emerson St., Denver, Colorado.) Engr., American Smelting & Refining Co., Durango, Colorado.
Brugger, Melvin, E. M. 1914. (870 17th Ave., Columbus, Nebraska.) Mining Engr., Societe International Forestiere et Miniere de Congo, Brussels, Belgium, Congo, Belge, Africa.
Bruhn, Elmer Franklin, M. S. 1925. (910 Sixteenth St. Golden, Colorado.) Asst. Prof. Civil Engineering Colorado School of Mines, Golden Colorado.
Bruhn, Frederick Erich, E. M. 1922. Edificio Palavicini, 409 Mexico City, Mexico Sales Representative, Ingersoll-Rand Company, 11 Broadway, New York, N. Y.
Brummett, Robert Stewart, E. M. 1926. Mitchell, Nebraska.
Brunel, Frank P., E. M. 1912. Box 355, Bisbee, Arizona. Consulting Engineer, Bisbee, Arizona.
Brunel, Rene Louis, E. M. 1906.
Bryan, Russell R., E. Met. 1908. Asst. Mill Supt., cia de Real del Monte y Pachuca, Apt. 57, Pachuca, Hgo., Mexico.
Bucher, John William, E. M. 1902. (4267 Federal Blvd., Denver, Colorado.) Chief Engr., Colorado Iron Works, 33rd & Wynkoop Sts., Denver, Colorado.
Buck, Arthur H., E. M. 1897. (3883 King St., Denver, Colorado.) Supt., The Empire Zinc Company, Gilman, Colorado.
Buck, Luther Jacobs, E. M. 1920. (Box 814, Durango, Colorado.) American Smelting & Refining Co., Leadville, Colorado.
Buckley, Howard G., E. M. 1921.
Budd, Montgomery, P. E. 1924. (Golden, Colorado. Asst. Secy.-Treas., Colorado School of Mines Alumni Assn. Director of Publications, Colorado School of Mines.
Budrow, William B., E. M. 1892. Deceased.
Buell, Arthur W., E. M. 1908. (Lewis Camp, Midwest, Wyoming.) Producing Dept., The Midwest Refining Company, Box 458, Lewis Camp, Midwest, Wyoming.
Bulkley, Frank, Hon. 1898. (1065 Pennsylvania Ave., Denver, Colorado.) 850 Equitable Bldg., Denver, Colorado.
Bumsted, Edward J., E. M. 1901. 505 Chapman Bldg., Los Angeles, California. Specializing in Avocado Culture, Los Angeles, California.
Bunger, Milne E., E. E. 1909. (913 Tascasa St., Trinidad, Colorado.) Model Land & Irrigation Company, 406 Bank Block, Trinidad, Colorado.
Bunte, Arnold S., Geol. Engr. 1926. (Grand Lake, Colorado.) Roxanna Petroleum Co., 13th Ave., Denver, Colorado.) City & Wirt, Oklahoma.
Bunte, Arthur Henry, E. M. 1922. (1305 East Colorado.
County of Denver, 301 City Hall, Denver,
Bunte, Ernest Benard, E. M. 1920. (1505 C. St., Sparrows Point, Maryland.) Bethlehem Steel Corporation, Sparrows Point, Maryland.
Burgess, Charles W., E. M. 1909. (142 West Cedar St., Denver, Colorado.) Mgr. Joplin National Bank Bldg., Joplin, Missouri.
Burlingame, Walter E., E. M. 1901. 1915 Lawrence St., Denver, Colorado.
Burns, Jay Joseph, E. M. 1916. (1218 Buffalo St., Franklin, Pennsylvania.) Tiger Mining Company, El Malino, Sonora, Mexico.
Burris, Samuel James Jr., E. M. 1915. (1118 Lincoln St., Denver, Colorado.) Tooele, Utah.
Burwell, Blair Jr., E. M. 1919. Asst. Gen. Mgr., New Minera de San Rafael y anexas, Apartado 47, Bis., Mexico City, Mexico.
Busey, A. P. Jr., E. M. 1905. Gen. Mgr., Penn. Mining Company, Camp Seco, California.
Bussey, Edwin E., B. S. 1897. Assayer, Treadwell-Yukon Company, Ltd., Kano Hill, Mayo District, Y. T., Canada.
Butcher, Gary Preston, E. M. 1924. Resident Geologist, Kirby Petroleum Co., Box 311, San Angelo, Texas.
Butler, G. Montague, E. M. 1902, Sc. D. Hon. 1922. Dean, College of Mines & Engineering, Director Arizona Bureau of Mines, University Station, Tuscon, Arizona.
Butler, Mifflin M., E. M. 1919. Mgr., Mountain Realty Corporation, Box 1003, Casper, Wyoming.
Butner, Daniel Worth, E. M. 1915.
Bynum, Charles Gerald, Geol. Engr. 1926. (854 S. Gaylord St., Denver, Colorado.) Geologist, Texas Co., Denver, Colorado.

# C

Cadot, John Pulius, E. M. 1915. (101 East Market St., York, Pennsylvania.) Vice President, Treas., Works Manager, Hardinge Company, Inc., York, Penna.
Caetani, Prince Gelasio, Hon. Sc. D., 1924. Palace Caetani, 32 Botteghe, Rome, Italy.
Cain, Louis S., E. M. 1913. (130 Kealohilani St., Honolulu, Hawaii.) City and County Engr., City & County of Honilulu, Kapiolani Bldg., Honolulu, Hawaii.
Cairns, James Hunter, E. M. 1925. (5603 Lake St., Colfax, Washington.) Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Caldwell, Florence H., C. E. 1898. (Mrs. Frank H. Jones) Clarkdale, Arizona.
Callahan, Thomas W., E. M. 1914. (1007 Travis Bldg., San Antonio, Texas.) Chief Geologist, Milham Corporation of Texas, 120 Broadway, New York, N. Y.
Calvert, Clarence E., E. M. 1912. (1008 West Porphyry St., Butte, Montana.) Asst. Foreman, Mt. View Mine, Anaconda Copper Mining Company, Butte, Montana.
Campbell, Kent P., E. M. 1910. (2136 Sixth St., Boulder, Colorado.) Supt., Asarco Plant, A. S. & R. Co., Matchuala, S. L. P. Mexico.
Campbell, Thomas Patterson, Sc. D. 1924. (668 Clarkson St., Denver, Colorado.) Electrochemical Engineer, 818 Patterson Bldg., Denver, Colorado.
Canning, Herbert A., E. M. 1897. Deceased.
Canning, Walter E., E. M. 1909. Cr. West Coast Refining Company, Placentia, California.
Carlson, Monroe O., E. M. 1915. (Box 91, Castle Gate, Utah.) Mining Engineer, Utah Fuel Company, Castle Gate, Utah.
Carman, John B., E. M. 1910. Mgr. Molybdeum Corporation of America, Questa, New Mxeico.
Carney, Hugh James, E. M. 1904. (817 N. Mesa Ave., Montrose, Colorado.)
Carpenter, Cranston H., E. M., E. Met. 1909. (R. R. 3, Irwin, Westmoreland County, Pennsylvania.)
Carpenter, Horace Flint, E. M. 1923. (3333 Moncrieff Place, Denver, Colorado.) Asst. Engineer, San Luis Mining Co., Estacion Dimas, Sinaloa, Mexico.
Carpenter, Paul H., E. M. 1910. Mill Supt. Doe Run Lead Company, St. Joseph Lead

Company, Rivermines, Missouri.
Carper, Armistead F., E. M. 1914. (201 Boston Bldg., Denver, Colorado.) Supt. Stratton Lease, Box 229, Victor, Colorado.
Carr, George Watson, E. M. 1925. (4312 Ninth Ave., N. E., Seattle, Washington.) Rovana Petroleum Company, 543 First National Bank Bldg., Houston, Texas.
Carstarphen, F. C., E. M. 1905. (901 Edgewood Ave., Trenton, New Jersey.) Consulting Engr., & Vice Pres., Manufacturers & Selling Company, Parker & Olden Aves., Trenton, New Jersey.
Carver, Alexander Brodie, E. M. 1925. (768 Woodland Ave., Plainfield, New Jersey.) Mineral Point Zinc Co., Galena, Illinois.
Cary, Webster P., E. M. 1910. (1057 Emerson St., Denver, Colorado.) A. S. & R. Co., Garfield, Utah.
Case, William Bennett, E. M. 1920. (Tulsa, Oklahoma.) Valuation Engineer, Roxanna Petroleum Corporation, Tulsa, Oklahoma.
Caster, Emil Leslie, E. Met. 1925. (Cr. Lee Baettner, Watson, Missouri.) Aguila Petroleum Co., Apt. 50, Tampico, Tampas, Mexico.
Chamberlain, W. O., E. M. 1905. (729 East 10th Ave., Denver, Colorado.) Real Estate Salesman, 628 U. S. National Bank Bldg., Denver, Colorado.
Chan, Albert K., E. M. 1917. Cr. Pacific Corporation, 62 Kiangse Road, Shanghai, China.
Chandler, John Winthrop, E. M. 1901. Deceased.
Chang, Ching Lien, E. M. 1921. (41 Chuan-Peng-Miao St., Kaifeng, Honan, China.)
Chang, Fu-Chuan, E. M. 1925. (Cr. C. M. Chang, International Savings Society.) Changsha, China.
Chang, Hui Je, E. M. 1921.
Chang, Jan Kien, E. M. 1921.
Chang , Marshall H., E. M. 1924. (Cr. Chinese Students' Club, 604 14th St., Golden, Colorado.)
Chao, Yuan Chen, E. M. 1919.
Chapman, Thomas L., E. M. 1906. (1052 Fifth Ave., Los Angeles, California.) Gen. Supt. Estelle Mining Company, Keeler, California.
Chapman, Irving A., E. M. 1913. Williams. Nicholas & Moran, Stock Exchange, 25 Broad St., New York, N. Y.
Charles, Iestyn Martin, E. M. 1921. (1414 Washington Ave., Golden, Colorado.) ceased.
Alamo Coal Co., G. & E. Bldg., Denver,
Charles, Lavern J., E. M. 1902. (3015 Oakland Ave., Minneapolis, Minn.) Senior Highway Engineer, 410 Hamm Bldg., St. Paul, Minnesota.
Charles, William O., E. Met. 1919. (Golden, Colorado.) Branch Engineer, The Oldsmobile Co., Denver, Colorado.
Chatfield, Ray Edward, E. M. 1924. (Momence, Illinois.) Asst. Engr., Leland Coal Co., Verona, Illinois.
Chatin, August Hubert, E. M. 1916. Mining Engineer, Gordon Coal Company, Box 424, Walsenburg, Colorado.
Chedsey, William R., E. M. 1908. (607 West Colfax Ave., State College, Pennsylvania.) Professor of Mining, Pennsylvania State College, State College, Pennsylvania.
Chen, Fan, E. M. 1916. Deceased.
Chen, Ye-Fah F., E. M. 1914.
Cheney, George M. E. M. 1917. (Williamstown, Mass.) Mine Engr., Andes Copper Mining Co., Casilla B, Antofagasta, Chile.
Cheng, Dah-Chun, E. M. 1014.
Chiang, Lu-Cheng, E. M. 1918.
Chiang, Y. K., E. M. 1917.
Chow, Tae Y., E. M. 1920.
Christensen, Walter, E. M. 1902. Druggist, 635 North Oxford, Los Angeles, California.
Christie, Russell Louis, E. M. 1924. (615 West Fair St., New Philadelphia, Ohio.) Engineer, Utah-Delaware Mine, Bingham Canyon, Utah.
Christopher, John, E. M. 1925. (East Hampton, Connesticut.) Shift Boss, Utah-Apex Mine, Bingham Canyon, Utah.
Christy, Harold Hamilton, E. M. 1922. (438 Pierce St., Port Townsend, Washington.) Mines Mgr., U. S. Radium Corporation, Box 484, Montrose, Colorado.
Church, Myron J., E. M. 1898. Deceased.
Clapp, Leroy P., E. M. 1909.
Clark, George B., E. M. 1901. (563 Emerson St., Denver, Colorado.) Cost Engr., Valuation Dept., Colorado & Southern Ry., Co., 456 Railway Exchange Bldg., Denver, Colorado.
Clark, James Ashley, E. M. 1921. (P. O. Box 1961, Denver, Colorado.) Petroleum Engineer, The Midwest Refining Company, Casper, Wyoming.
Clark, Louis F., E. M. 1914. (Cr. Old National Bank, Grand Rapids, Michigan.) Chemist, Experimental Plant, Cerro de Pasco Copper Corporation, Jacobus Ave., Kearney, New Jersey.
Clark, Winfred N., E. E. 1898. (1104 Greenwood, Canon City, Colorado..) Mgr., Mountain Division, Southern Colorado Power Company, Canon City, Colorado.
Clarke, George Wooding, E. M. 1923. (3825 North McKinley St., Oklahoma City, Oklahoma.) Member Firm, Clarke, Gilbert & Company, Oil Operators, 638 American National Bank Bldg., Oklahoma City, Oklahoma.
Clarke, Harry Edwin, E. M. 1925. (Rochester, New York.)
Clarke, Roscoe H., E. M. 1917. Engr.. & Assayer, Benquet Consolidated Mining Co., Banquio, P. I.
Clausen, Samuel J. Jr., E. M. 1911.
Clifford, Thomas Jeremiah, E. M. 1921.
Cline, Seymour P., E. M. 1908. (224 Eastlawn Ave., Detroit, Michigan.) Asst. Purchasing Agent, Michigan Alkali Company, 1622 Ford Bldg., Detroit, Michigan.
Clopton, John Hale, E. M. 1923. (102 East Ashby St., San Antonio, Texas.) Asst. Geologist, "El Aguila" Oil Company, Apartago 150, Tampico, Tamps, Mexico.
Clough, Richard Hudson, E. Met. 1922.
Coghill, Will H., E. M. 1903. Metallurgist, U. G. Bureau of Mines, Rolla, Mo.
Cohen, Louis, E. M. 1897. 228 West Irvington Place, Denver, Colorado.
Colburn, C. L., E. M. 1907. (2290 Eudora St., Denver, Colorado.) Consulting Mining Engineer, Denver, Colorado.
Cole, Burt, E. M. 1892.
Cole, Edwin George, P. E. 1925. (Box 1595, Tulsa, Oklahoma.) Box 1595, Tulsa, Oklahoma.
Coleman, R. Prewitt, E. M. 1903. Deceased.
Collbran, Arthur Harry, E. M. 1902. Gen. Mgr., Chosen Syndicate, Ltd., Taiyudong, Korea.
Collier, Edward Malcolm, E. M. 1922. (200 South Washington St., Denver, Colorado.) Law Student, 504 E. & C. Bldg., Denver, Colorado.
Collins, Phillip M., E. M. 1893. Deceased.
Collins, Shrive B., E. M. 1901. Pres. && Gen. Mgr., American Fluor Spar Mining Company, Wagon Wheel Gap, Colorado.
Coloney, Herndon Percival, C. E. 1924. Bradentown, Florida) F. K. Webb & Co., Bradentown, Florida.
Comstock, Charles W., C. E. & M. E. 1890. Engineer, Dwight P. Robinson Inc., 125 E. 46th St., New York, N. Y.
Conley, William Albert, E. M. 1919. Apt. 56, Zazatecas, Zac., Mexico.
Connors, Hugh Murray, E. M. 1922. (618 Lafayette St., Denver, Colorado.) United States Mint, Denver, Colorado.
Cooper, Edward Nelson, Jr., E. M. 1921. (Camp Hill, Pennsylvania.) A. S. & R. Co., 1112 Mills Bldg., El Paso, Texas.
Copeland, Clarence E., E. M. 1915. Deceased.
Copeland, Norman R., E. M. 1918. (1002 East 17th Ave., Denver, Colorado.) Mgr., Compensation & Liability Department, International Indemnity Company, 315 Montgomery St., San Francisco, Calif.
Cormack, William White, E. M. 1926. (1620 Grove Ave., Richmond, Virginia.)
Corry, Arthur V., E. M. 1898. (825 West Galena St., Butte, Montana.) Member Firm, Engineers and Surveyors, 30 West Granite Street, Butte, Montana.
Corson, Norman G., E. M. 1907. (Sarasota, Florida.) Asst. County Engr., Sarasota County, Sarasota, Florida.
Cory, J. J., E. M. 1905. (1175 South High St., Denver, Colorado.) Principal South Side High school, Denver, Colorado.
Cotulla, Louis Edward, Geol. Engr., 1925. (209 Eleanor Ave., San Antonio, Texis.) Geologist Texas Pacific Coal & Oil Co., Thurber, Texas.
Coulter, Ronald Scott, E. M. 1919. (604 C. St., Sparrows Point, Maryland.) Steam & Combustion Engr., Bethlehem Steel Company, Sparrows Point, Maryland.
Cowperthwaite, Edward W., E. M. 1915. (Box 655, Ruth Nevada.) Shift Boss, Nevada Consolidated Co., Ruth, Nevada.
Cox, Augustus D., E. M. 1903. Mgr., Yuma Valley Farm Bureau, Yuma, Arizona.
Cox, W. Ray, E. M. 1902. (560 Elizabeth St., Portland, Oregon.) Mineral Examiner, U. S. General Land Office, 616 Post Office Bldg., Portland, Ore.
Craig, Allan E., E. M. 1914. (553 Elati St., Denver, Colorado.) Shop Supt. Mine & Smelter Supply Company, Denver, Colorado.
Craigue, William H., E. M. 1889. (5519 Conduit Road, Washington, D. C.) Valuation Engineer, Income Tax Unit, Washington, D. C.
Cramer, Curtis P., E. M. 1899. Deceased.
Cramer, Herbert Edward, E. M. 1925. (121 South Toledo, Leadville, Colorado.) Cramer & Company, Leadville, Colorado.
Crampton, Theodore, H. M., E. M. 1914.
Crawford, George William, E. M. 1923. (400 U. Street, Noquiam, Washington.) Sarasota, Florida.
Crawford, Paul Wesley, E. M. 1922. (Cooperstown, North Dakota.) Combustion Dept., Standard Oil Company, of Indiana, 523 South Beach St., Casper, Wyoming.
Crawford, Ronald Francis, E. M. 1923. Box 57, R. F. D. No. 2, Sarasota, Florida.
Crawford, William Phillips, E. M. 1922. (743 Myrtle Ave., Charleston, W. Va.) Engr. Akron Mines, Whitepine, Colorado.
Cronin, George Harold, E. M. 1926. (Aberdeen, Maryland.)
Cronin, Harry M., E. M. 1913. (1218 Kalamath St., Denver, Colorado.)
Crow, Wade L., E. M. 1901. Deceased.
Crowe, Thomas B., E. M. 1900. (233 Tennyson Ave., Palo Alto, California.) The Merrill Company, 121 Second St., San Francisco, California.
Crutcher, Ernest R., E. M. 1914. (949 F Street, Salida, Colorado.) Supt. Electrical Furnace Dept., Anaconda Copper Mining Company, 20 Smelter Hill, Great Falls, Montana.
Cunningham, Joseph Matthew, E. M. 1922.
Cunningham, Morris Frederick, E. M. 1924. (4568 Oakenwald Ave., Chicago, Illinois.) Goodman Manufacturing Company, 4800 Halsted St., Chicago, Illonois.
Cunningham, Samuel Davis, Jr., E. M. 1921. (1654 Vineyard St., Los Angeles, California.) The Crane Mfg. Company, Los Angeles, California.
Cuno, A. F., E. M. 1905. Deceased.
Currens, Warren W., E. M. 1912. Chemist Cons. Water Co., Box 208 Little Falls, N. J.
Curtis, Leroy P., E. M. 1909. (89 West St., Newburgh, New York.) Secy.-Treas., Newburgh Bldg., & Supply Corp, 490 Broadway, Newburgh, New York.
Curtis, Ralph Douglas, B. E. 1926. (851 South Washington St., Denver, Colorado.)
Curzon, Eugene Charles, E. M. 1923. (755 South Burlington Ave., Los Angeles, California.

# D

Dakin, Francis Winnie, 1923. (1134 Hinman Ave., Evanston, Illinois.) Petroleum Geologist, R. A. Conkling, 1109 Colcord Bldg., Oklahoma City, Oklahoma.
Daman, Arthur Chester, E. M. 1915. (2615 Albion St., Denver, Colorado.) Sales Engineer, Stearns-Rogers Manufacturing Co., 1720 California St., Denver, Colorado.
Daman, C. J ..E. M. 1913. Deceased.
Dannettelle, Merle Q., E. M. 1923. (4923 West 31st Ave., Denver, Colorado.) Asst. Geologist, Midwest Refining Company, 933 First National Bank Bldg., Denver, Colorado.
D'Arcy, R. L., E. M. 1905.
Dauth, Herman, E. M. 1913. Engr., West End Con. Mfg. Co. Syndicate Bldg., Oakland, California.
Davenport, John. E. M. 1912. Pres. & Gen. Mgr. Franklin Mineral Products Co., Franklin, North Carolina.
Davey, William R., E. M. 1898. Deceased.
Davidson, Arthur Presley, E. M. 1926. (Florence, Colorado.)
Davis, Arthur Dorsey, E. M. 1922. (623 West 8th St., Appleton, Wisconsin.) Shift Boss, Tecolates Mine, American Smelting & Refining Company, Santa Barbara, Chih., Mexico.
Davis, Carl R., E. M. 1895 (Cr. Anglo American Corporation of S. A., Box 4587, Johannesburg, South Africa.) Consulting Engineer, Anglo American Corporation of South Africa.
Davis, Donald Morrison, Geol. Engr. 1925. (1335 Columbia Road, N. W., Washington, D. C.) Field Adviser Geophysical Dept. Humphreys Corp., Houston, Texas.
Davis, Gilbert, L., E. M. 1899. (Route 1, Missoula, Montana.) Irrigation Engineer, Missoula, Montana.
Davis, Gilmore Sherman, E. M. 1915. Pres., The O. L. Davis Lumber Company, Trinidad, Colorado.
Davis, John R., E. M. 1913. Florist, Wheat Ridge, Colorado.
Davis, John Stephen Neal Jr., E. M. 1920. (St. Marys, Georgia.)
Davis, Ninetta Allia, E. M. 1920. (3520 Clay St., Denver, Colorado.)
Davis, Thomas, P. E. 1925. (R. 1, Box 8, Greeley, Colorado.) Tide Water Refining Company, Drumwright, Oklahoma.
DeCamp, W. Val., E. M. 1908. (Box 1401, Jerome, Arizona.) Mine Supt., United Verde Copper Company, Jerome, Arizona.

DeCou, Ralph Ernest, E. M. 1901. 709 Forest Ave., Tempe, Arizona.
DeFord, Ronald Kinnison, E. M. 1921, M. S. 1922. (44½ Lincoln Place, Denver, Colo.) Geologist, Midwest Refining Company, Box 240, Denver, Colorado.
DeGolyer, E. L., Hon. Sc. D. 1925. New York, N. Y.
Delahunty, Frank E., E. M. 1925. (2020 W St., Sacramento, California.) Recorder, Open Hearth Department, Plant No. 1, Inland Steel Company, 3813 Fir St., Indiana Harbor, Indiana.
Denning, Wayne H., Geol. Eng. 1926. (1115 11th St., Golden, Colorado.) Asst. Geologist, Midwest Refining Company, Denver, Colorado.
Denny, John Henry, E. M. 1923. 3475 Fourteenth St., N. W., Washington, D. C.
Denunzio, Vincent Louis, E. M. 1923. (2036 Woodford Place, Louisville, Kentucky.) Mining Engineer, Louellen, Harlan County, Kentucky.
Deringer, DeWitt Clinton, Jr., E. M. 1924. c|o Mazapil Copper Company, Ltd. Aranzazu, Zacs., Mexico, Mill Superintendent.
Desgrey, Charles W., E. M. 1926. (26 Highland Avenue, Yonkers, N. Y.)
DeSollar, Tenney Cook, E. M. 1904. Woodward Iron Company, R. F. 2, Bessemer, Alabama.
Dessau, Max W. E. M. 1926. (Phoenix, Arizona, c|o Indian School.) Box 837, Tooele, Utah.
Devinney, George V., E. M. 1903. Deceased.
Dick, James E., E. M. 1912. Mgr. Akron Mines, Whitepine, Colorado.
Diehl, Robert C., P. E. 1926. (2309 Bonnie Brae, Santa Ana, California.)
Dilts, Ira J., E. Met. 1908. (514 Remington St., Fort Collins, Colorado.) Supt. U. S. Portland Cement Company, Concrete, Colorado.
Dittus, Edward J., E. Met. 1911. Deceased.
Dockery, L. A., E. M. 1895. Deceased.
Dodge, Davis C. Jr., E. M. 1925. (439 Gilpin St., Denver, Colorado.) Stewart-Warner Company, 1153 Bannock St., Denver, Colorado.
Dollison, James E., E. M. 1898. Alma, Colorado.
Dolph, Orman Patterson, E. M. 1925. (Cedaredge, Colorado.)
Dorrance, James Ruy, E. M. 1922. (218 E. Hill St., Walnut Park, Los Angeles, California.) Engr., City Sub-division, Los Angeles, California.
Douglass, William C., E. M. 1911. (676 West 8th St., Plainfield, New Jersey.) Mine Supt. Kennecott Copper Company, Kennecott, Alaska.
Dove, Dean R., E. M. 1913. The Western States Machine Company, 206 Dooly Bldg., Salt Lake City, Utah.
Dow, William Greer, E. M. 1906. Field Engr., St. Joseph Lead Company, Bonne Terre, Missouri.
Dowden, Ethlebert Jr., E. M. 1920. (Plainview, Texas.)
Downer, Roger H., E. M. 1901. Box 175, Goldfield, Nevada.
Downes, Frank A., E. M. 1913. (613 Fourteenth St., Golden, Colorado.) Engr. in Development Dept., The Dorr Company, 247 Park Ave., New York, N. Y.
Doyl, Donald B., E. M. 1909. Consulting Engineer, Societe Internationale Forestiere et Miniere de Congo, Forminiere, Tshikapa, Kasai, Congo, Belge.
Drake, Cecil, E. M. 1922. (Lyons, Kansas.) Engr., Cia Mexicana de Petroleo, "El Aguila," Apartado 150, Tampico, Mexico.
Draper, Marshall D., E. M. 1897. 720 Detwiler Bldg., Los Angeles, California.
Drescher, Frank M. E. M. 1900. Engineer Craig, Colorado.
Dudgeon, James, W., E. M. 1913. (4350 Raleigh St., Denver, Colorado) Engineering Department, Great Western Sugar Company, Denver, Colorado.
Duer, C. L., E. M. 1905. (1054 Steele St., Denver, Colorado.) District Mining Supervisor, U. S. Bureau of Mines, 500 Custom House Bldg., Denver, Colorado.
Duggleby, Alfred Francis, E. M. 1915. (2634 Locust St., Davenport, Iowa.) Supt., The Alleghany Mining Company, 648 Mills Bldg., San Francisco, California.
Dunkle, Fred W., E. M. 1903. Deceased.
Dunlevy, Forrest S., E. Met. 1908. P. O. Box 132, Price, Utah.
Dunn, George Vincent, E. M. 1920. (1420 Baltimore St., Tulsa, Oklahoma.) White Eagle Oil & Refining Company, Tulsa, Oklahoma.
Durell, Charles T., E.M. 1895. 1349 Kenyon St., N. W., Washington, D. C.
Dutton, Dewey Alva., E. M. 1921. (4531 South Broadway, Englewood, Colorado.) Cost Accountant, Materials of Construction, Moffat Tunnel Commission, East Portal, Colorado.
Dwelle, Jesse E., E. M. 1896. Deceased.
Dyer, Charles E., E. M. 1910. Durango, Colorado.
Dyrenforth, Donald, E. M. 1912. (2635 Bellaire St., Denver, Colorado.) Equipment Engr., The Dorr Company, 1009 Seventeenth St., Denver, Colorado.

# E

Eames, L. B., E. M. 1905. 2104 Gaylord St., Denver, Colorado.
East, John H. Jr., E. M. 1910. (3427 Vine St., Denver, Colorado.) No. 11 Weston Place, Shenandoah, Penna.
Eaton, Albert L., E. M. 1895. Gen. Mgr., El Potosi Mining Company, Apt. 13, Chihuahua, Chih., Mexico.
Eaton, Walter J., E. M. 1913. (808½ Spurgeon St., Santa Ana, California.) Supt. Mines, San Francisco Mines of Mexico, Ltd., Parrel, Chih., Mexico.
Eddy, Harold C., E. M. 1909. (1904 Middleton Place, Los Angeles, California.) Chief Engr., Petroleum Rectifying Co., of California.) 308 Union Oil Bldg., Los Angeles, California.
Edgeworth, Joseph Edward, E. M. 1921. (3118 West 26th Ave., Denver, Colorado.) Union Pacific Coal Co., Box 1035, Rock Springs, Wyom.
Edwards, Robert Marvin, E. M. 1923. 125 East 11th Avenue, Denver, Colorado.
Ehle, Mark Jr., E. M. 1901. (Box 265, Tucson, Arizona.) Professor of Mining, University of Arizona.) Tucson, Arizona.
Ehnbom, Lincoln, E. M. 1917. Engr. & Geologist Piermont Mine, Aurum via McGill, Nevada.
Ehrick, Walter L., E. M., 1902. (241 East 48th St., New York, N. Y.) Secy. Treas., The Ehrich Galleries, 707 Fifth Ave., New York, N. W.
Ehrlick, Alia Timothy, E. M. 1925. (1444 Emerson Street, Denver, Colorado.) Fitzsimmons Hospital, Denver, Colorado.
Elder, Robert B., E. Met. 1908. Deceased.
Eldridge, Samuel, E. M. 1924. (1211 Arapahoe St., Golden, Colorado.) Selby, California.
Ellis, T. P., E. M. 1907. Deceased.
Ellis, William Witty, E. M. 1902. 1913 17th Ave., Denver, Colorado.
Ellsworth, Alfred C., E. M. 1908. Pres. Ellsworth Coal Company, 315 Globe Bldg., Pittsburg, Kansas.
Emeis, Walter A., E. M. 1904. Emeis Electrical Service, 216 Iowa St., Davenport, Iowa.
Emens, Ray B., E. M., E. Met. 1907. (Box 532, Victor, Colorado.) Engr., Portland Gold Mining Company, Victor, Colorado.
Emler, Charles Raymond, Chem. Engr. 1925. (2360 Grinstead Drive, Louisville, Kentucky.) The Koppers Company, Box 533, Detroit, Michigan. (Temp. Address, Box 292, Utica, N. Y.)
Emrich, Clarence T., E. M. 1909. (728 Stanley Ave., Long Beach, California.) Vice-Pres. & Director, Southern Paper Box & Carton Co., 1822 Cherry St., Long Beach, California.
Emrich, Horance H., E. M. 1903. Deceased.
Emrich, Jay L., E. M. 1912. Minister, Green Mountain, Iowa.
Engle, Frederick, E. Met. 1911. University Club, Salt Lake City, Utah.) Chief Chemist, American Smelting and Refining Co., Garfield, Utah.
Enriquez, Eduardo W., E. M. 1909. (Ave. Vicente Guerrero No. 373, Chihuahua, Chih., Mexico.) Calle Aldama No. 101, Chihuahua, Chih., Mexico.
Erickson, Guy W., E. M. 1912. Deceased.
Espinosa, E. Miguel, E. M. 1914. Ira Sta., Tereza 30, Mexico City, Mexico.
Essig, Benjamin Clark, E. M. 1915. (1111 Twelfth St., Golden, Colorado.) Branch Mgr., Denver Rock Drill Company, St. Louis, Missouri.
Estes, Frank M. Jr., E. M. 1902. (Cr. Bank of Montreal, 64 Wall St., New York N. Y.) Gen. Mgr., Dolore Mines Company, Madera, Chih., Mexico.
Ettington, Martin, E. Met. 1923. (536 South Atlanta, Tulsa, Oklahoma.) Member General Superintendent's Staff, Empire Refineries Inc., 701 Commercial Bldg., Tulsa, Oklahoma.
Euwer, Maxwell Lee, P. E. 1925. (Pleasonton, Kansas.) Camp Geologist, Mexican Eagle Oil Co., Cia "El Aguila," Puerto, Mexico.
Evans, Douglass Fennell, Chem. Engr., 1925. (236 Lime Ave., Apt. 7, Long Beach, California.)
Evans, E. Paul, E. M. 1926. (Wellston, Ohio.)
Evans. John Raymond, E. M. 1923. (121 North Benton St., Ottumwa, Iowa.) Midwest Exploration Co., Abilene, Texas.
Evans, Henry R., E. M. 1900. Resident Engineer, Colorado State Highway Commission, Denver, Colorado.
Evans, Willis W. ,E. Met. 1908. Deceased.
Everest, Herbert A., E. M., E. Met. 1908. (511 East 10th St., Oklahoma City, Oklahoma.) Engineering Research, 1032 N. Ogden Drive, Hollywood, California.
Ewing, Charles R., E. M. 1900. Livestock Grower, Del Norte, Colorado.
Eye, Clyde M., E. M. 1895. Benquet Consolidated Mining Company, 1107 Hobart Bldg., San Francisco, California.

# F

Fairbairn, Frank Manhard, E. Met. 1923. Chemist, Portland Gold Mining Company, Victor, Colorado. (Berthoud, Colorado.)
Farlow, Clarence Alfred, E. M. 1922. (945 Claremont Ave., Pueblo, Colorado.) Engr., Miami Copper Company, Box 1168, Miami, Arizona.
Farmer, Ray Jackson, E. M. 1923. (Box 773 Morenci, Arizona.) Underground Transitman, Phelps-Dodge Corporation, Morenci Branch, Morenci, Arizona.
Farnam, Lynn C., E. M. 1909. (Pres., Farnam Construction Company, 5047 Gladstone Ave., Minneapolis, Minnesota.
Farrar, Russel J., E. M., 1910. (Salem, Oregon.) Box 411, Mullen, Idaho.
Fay, Charles H., E. M. 1913. Deceased.
Fay, Herbert M., E. M. 1913. (Leonard Hotel, Butte, Montana.) Tuolumne Copper Company, 73 Hisbom Bldg., Butte, Montana.
Febles, John C., B. S. 1897. Elkhorn Mine, Wise River, Montana.
Fenton, Clyde Henry, E. M. 1923. (320 East Doty Ave., Neenah, Wisconsin.) Shift Boss, International Nickel Co., Ltd., Creighton Mine, Ontario, Canada.
Ferguson, Kenneth S., E. M. 1917. (2060 Dahlia St., Denver, Colorado.) Midwest Exploration Co., Coleman, Texas.
Ferguson, Robert DeWitt, E. M. 1922. (Pueblo, Colorado.)
Fidel, Henry Peter, P. E. 1923. (Grand Junction, Colorado.) Resident Gas Engineer, Shell Oil Company, Brea, California.
Field, Edmund M., E. M. 1912. (234 Brush Creek Blvd., Kansas City, Missouri.) Attorney, 229-232 Rialto Bldg., Kansas City, Missouri.
Field, Fred M., E. M. 1895. Deceased.
Fillius, Lee L., E. M. 1904. Mgr., Anna Beaver Mines Company, Metals Exploration Company, Cardin, Oklahoma.
Filteau, C. A., E. M. 1907. Waxhaw, N. C.
Finningan, William H., E. M. 1906. (7600 Teasdale Ave., St. Louis, Missouri.) Pres. & Gen. Mgr., McGowan & Finigan Cordage Co., 3338 Washington Blvd., St. Louis, Missouri.
Fischer, Oscar A., E. M. 1914. (773 Williams St., Denver, Colorado.) Engineer, Metals Exploration Company, 1429 Eighteenth St., Denver, Colorado.
Fishwild, Allison A., E. M. 1923. (Wyoming, Iowa.) Bisbee, Arizona.
Fiske, Harry Mater, E. M. 1921. (210 Enchid Ave., Long Beach, California.) Salesman, Ingersoll-Rand Company, 834 Higgins Bldg., Los Angeles, California.
Fitzgerald, Ronald P., E. M., E. Met. 1910. 108½ Main St., Roswell, New Mexico.
Fleming, William L., E. M. 1903. (Forest Hills, N. Y.) 50 Broad St., N. Y.
Flinn, Alfred R., E. M. 1913. Mine Supt., Empire Zinc Company, Hanover, New Mexico.
Flint, F. F., E. M. 1905. Hilltop, Colorado.
Flint, Howard Thomas, E. M. 1920, P. E. 1922. c|o Roxana Oil Company, Houston, Texas.
Floyd, John A., E. M. 1888. Deceased.
Fominyh, Michael P., E. M. 1926. Eagle Copper Co., Engelmine, California.
Fong, Kin Lau, E. M. 1922. (Chiyih, Plyuan, China.) Prof. Geology, Chen Chow University, Kaifeng, Honan, China.
Foo, Keat Kheng, E. M. 1922. (la Light St., Penang, Straits Settlements.) Ford Motor Comany, 261 Windemere Ave., Highland Park, Detroit, Michigan.
Foo, Shu, E. M. 1914.
Foote, Frederick W., E. M. 1914. (40 Rector St., New York, N. Y.) Mgr. Gossan Mines, Monarat, Va.
Fopeano, Louis Clement, E. M. 1921. (Konnarock, Washington County, Virginia.) Supt., Anode Plant, Chile Exploration Company, Chuquicamata, Chile, S. A.
Forbes, Henry H., E. M. 1913. 6 Morningside Road, Worchester, Mass.
Ford, Homer D., E. M. 1905. (290 South Grant St., Denver, Colorado.) Superintendent, Gilson Asphaltum Company, Watson, Utah.

**Fosdick, Arthur Ray, E. M. 1923.** (4451 Zuni St., Denver, Colorado.) Engr., Investigation Dept., Phelps-Dodge Corporation, Morenci, Arizona.

Foster, Earl Franklin, E. M. 1924. (702 West 8th St., North Platte, Nebraska.) Junior Mining Engineer, South American Development Company, Guayaquil, Ecuador, S. A.

Foster, George C., E. M. 1903.

Foulkes, Thomas Griffith, E. M. 1922, M. S. 1923. (Columbine Grove, Ohio.) 540 Seneca St., Bethlehem, Penn.

Francis, Theodore Newton, E. M. 1924. (2510 East 11th Ave., Denver, Colorado.) Cerro de Pasco Copper Co., Marococha, Peru.

Franck, Albert Carl, E. M. 1904. Deceased.

Franck, Robert Philip, E. M. 1904. Civil Engr., 1839 Altura St., San Diego, California.

Frank, Harry L. E. M., 1901. Deceased.

Frank, Morton E., E. M. 1906. (4516 Drexel Blvd., **Chicago, Illinois.)**

Frankel, Jacob M. E. M. 1913. **Box 843, Clifton, Arizona.**

Frazee, Verne, E. M. 1912. District Manager, Oakley Chemical Company, 913 Chestnut St., St. Louis, Missouri.

Freeland, William Henry, E. M. 1906. Deceased.

Freeman, William A., E. M. 1923. (56 Grant St., Denver, Colorado.) Freeman Chemical Company, 696 So. Broadway, Denver, Colorado.

Frees, Chester, E. M. 1926. (5536 Agatile Ave., Chicago, Illinois.)

French, Burr J., E. M. 1908. (West Branch, Michigan.) Western Electric Company, 5558 Jackson Blvd., Chicago, Illinois.

French, Clare L., E. M. 1913. 411 St. Pauls Ave., Jersey City, New Jersey.

French, Sidney W., E. Met. 1908. (2525 Elm St., Denver, Colorado.) Guadalajara, Jalisco, Mexico.

Frenzell, Ernest Herbert, E. M. 1921. Asst. Mgr., La Luz & Los Angeles Mining Co., Via Bluefields, Nicaragua, C. A.

Frey, Carl E., E. M. 1913. Anaconda Copper Co., Anaconda, Montana.

Frick, Frederick F., E. Met. 1908. (Brentwood Apartments, Anaconda, Montana.) Research Testing Engineer, Anaconda Copper Mining Company, Anaconda, Montana.

Friedhoff, W. H., E. M. 1907. (Yerington, Nevada.) Mineral Examiner, U. S. Forest Service, Ferry Bldg., San Francisco, California.

Frobes, Clarence David, E. Met. 1924. (925 Logan Ave., Salt Lake City, Utah.) Engr. St. Joe Lead Co., Bonne Terre, Mo.

Frobes, Daniel Charles, E. M. 1924. (925 Logan Ave., Salt Lake City, Utah.)

Frost, James Frank, E. M. 1925. (700 Ninth St., Golden, Colorado.) American Smelting & Refining Company, Hayden, Arizona.

Fry, Louis D., E. M. 1903. Supt. Saltillo Smelter, Mazapi Copper Co., Ltd., Saltillo, Coahuila, Mexico.

Fullaway, Richard Merle, E. M. 1916. (1422 Courtland Ave., Los Angeles, California.) Operator, Compressor & Absorption Gas Plant, Standard Oil Company of California, Santa Fe Springs, California.

Fullerton, Wilfred, E. M. 1912. 1208 Sherman St., Denver, Colorado.

Funk, Walter A., E. M. 1903. Asst. Prin. High School, Paso Robles, California.

Galindo, Carlos Manuel, E. M. 1924. (Apartado 33, Piedras Negras, Coah., Mexico.) (Via Eagle Pass, Texas.) By-Product Plant Operator, Cia Carbonifera de Sabinas, S. A., Rosita, Coah., Mexico.

## G

Galligan, John T., E. M. 1911. Deceased.

Gallucci, Nicholaw Frank, E. M. 1920. (Louisville, Colorado.) Supt. Export Refining Corporation, 1528 Marcelina Ave., Torrance, California.

Gardner, John Ira, E. M. 1906. Deceased.

Garnett, S. Addison, E. M. 1920. **(1315 Court St., Pueblo, Colorado.** The Empire Zinc Company, Gilman, Colorado.

Garnett, Thomas H., E. M. 1911. (1317 Court St., Pueblo, Colorado.) Gen. Supt., Mining Department, Mineral Point Zinc Company, Galena, Illinois.

Garrison, Murray E., E. M. 1916. 329 F St., Bakersfield, California.

Garza, Aldape J. M., E. M. 1905. (1423 Matamoros Ave., Torreon, Coah., Mexico.)

Gaul, John C., E. M. 1912. Asst. Gen'l. Supt. Bell Mine, Anaconda Copper Min. Co., Butte, Montana.

Gauthier, Charles Bell, E. M. 1916.

Geary, Ernest S., E. M., E. Met. 1912. (1220 South Sherman St., Denver, Colorado.) Industrial Fuel Engineer, The Public Service Corporation of Colorado, Denver, Colorado.

Geary, Richard E., E. M. 1909. Mgr. Klamath Lake Diking Company, Box 404, Klamath Falls, Oregon.

Gebo, William Marian, E. M. 1923.

Gehrmann, Charles A., B. S. 1886; 1186 Arcade Bldg., St. Louis, Missouri.

Geib, Karl V., E. Met. 1911. c|o Molydenum Corp. of American, Questa, New Mexico.

Geisel, C. R., E. M. 1907. (2714 East 13th Ave., Denver, Colorado.) City Division, Board of Water Commissioners, City and County of Denver, 1509 Cleveland Place, Denver, Colorado.

Geringer, George T., E. M. 1910. (Ria Guinobatan, Masbate, P. I.) Secretary and Treasurer, Panique Mines, Rio Quinobatan, Masbate, Philippine Islands.

Gibson, Fred Daniel, E. M. 1926. (100 15th St., Golden, Colorado.)

Gibson, Robert W., E. M. 1918.

Giddings, Donald S., E. M. 1900.

Gilbert, Arthur K., E. M. 1906. 4494 Meade St., Denver, Colorado.

Gilbert, William J., E. M. 1906. Nevada Consolidated Copper Company, Ruth, Nevada.

Gilkison, Warren, E. M. 1923. (4041 West 29th Ave., Denver, Colorado.) Phelps-Dodge Corp. Pilares de Nacozari, Sonora, Mexico.

Glasgow, Charles M., E. M. 1910. Idaho Springs, Colorado.

Goddard, Homer Ahimaz Jr., E. M. 1925. (218 E. Broadway, Wellston, Ohio.) Wellston Clay Products Company, Wellston, Ohio.

Goe, Harold H., E. Met. 1908. (611 Maple St., Anaconda, Montana.) Supt., Roaster & Reverberatories, Anaconda Copper Mining Company, Anaconda, Montana.

Golden, J. P., E. M. 1907. Register Land Office, O'Neill, Nebraska.

Goldfain, George, E. M. 1917. 2773 W. 13th Ave., Denver, Colorado.

Goodale, F. Augustus, E. M. 1910. (1007 Terrace 50, Los Angeles, California.) Supt. & Engr., The Columbia Oil Shale & Refining Co., Grand Valley, Colorado.

Goodale, Stephen L., E. M. 1904. (1156 Murrayhill Ave., Pittsburgh, Pennsylvania.) Professor of Metallurgy, University of Pittsburgh, Pittsburgh, Pennsylvania.

Goodier, Benjamin D., E. M. 1922. (2541 Bellaire St., Denver, Colorado.) Mgr., The Grant County Mining Company, Silver City, New Mexico.

Goodwin, George Gerald, E. M. 1920. (2126 Wilson, Fresno, California.) Vice-Pres., & Mgr., Pacific Tent and Awning Company, Fresno, California.

Gordon, John Gardner, Jr., E. M. 1906. (480 North Stonewall Place, Memphis, Tenn.) Vice-Pres., & Gen. Mgr., Lane & Bowler Company, Memphis, Tennessee.

Gow, P. A., E. M. 1907. Gen. Mgr., Tuolumme Copper Company, Butte, Montana.

Gow, Thomas Tsungte, E. M. & M. S. 1914.

Graham, Allan H., E. M. 1915. (Ottawa, Ohio.) Dist. Mgr., Engineer & Mining Journal Press, 359 Leader News Bldg., Cleveland, Ohio.

Graham, David John, E. M. 1921. (50 East Philadelphia, Detroit, Michigan.) Engr., Arizona Power & Water Company, Clifton, Arizona.

Grant, Lester S., E. M. 1899. (922 Fifteenth Street, Golden, Colorado.) Dean and Professor of Mining, Colorado School of Mines, Golden, Colorado.

Grant, Paul Ambrose, E. M. 1923. (Columbus, Montana.) Asst. Geologist, Humphreys Corp., Houston, Texas.

Gray, Latimer D., E. M. 1895. (Chandler, Oklahoma.) Pres. & Mgr., Bigheart Ice Company, Barnsdall, Oklahoma.

Gray, Thomas Earl, Geol. Engr. 1924.

Gray, William Parker, E. M. 1923. (702 South Cheyenne, Tulsa, Oklahoma.) Asst. Supt. U. S. Zinc Company, Amarillo, Texas.

Graybeal, Edward V., E. M. 1914. (cr. J. A. Wilcoxson, De Beque, Colorado.) Engr., Miami Copper Company, Box 100, Miami, Arizona.

Greensfelder, Nelson S., E. M. 1912. Editor, The Explosives Engineer, Wilmington, Delaware.

Greenspoon, Jack, P. E. 1926. (2554 W. 10th Ave., Denver, Colorado.)

Greenwood, John Harold, E. M. 1915. (513 First Ave., Salt Lake City, Utah.

Gregg, Daniel B., E. M. 1913. (c|o E. B. Gregg, 706 Provident Bank Bldg., Cincinnati, Ohio.)

Gregg, Donald Cameron, E. M. 1922. (838 Galapago St., Denver, Colorado.)

Gregory, Joseph Nalle, E. M. 1923. (509 Sul Ross Ave., Houston, Texas.)

Greve, E. E., E. M. 1905. (152 Grant St., Pittsburgh, Pennsylvania.) Chief Engineer, Oil Well Supply Company, 215 Water Street, Pittsburgh, Pennsylvania.

Grider, R. L., E. M. 1905. (1400 Louisiana St., Lawrence, Kansas.) Associate Professor of Mining, University of Kansas, Lawrence, Kansas.

Grier, Charles D., E. M. 1912. American Cyanamid Company, Box 619, Johannasburg, Transvaal, S. Africa.

Griffith, John R., E. Met. 1909. (423 Jefferson Ave., Niagara Falls, N. Y.) Production Engineer, Norton Company, Niagara Falls, New York.

Grigsby, Gail G., E. M. 1914. (4233 Knox Court, Denver, Colorado.) Engr., St. Joseph Lead Company, Bonne Terre, Missouri.

Griswold, George G., B. S. 1896.

Griswold, George G. Jr., E. M. 1914. (1730 Lowell, Butte, Montana.) Research Engr., Timber Butte Milling Co., Butte, Montana.

Grommon, Philo D., E. Met. 1907. Berthoud, Colorado.

Gross, John, E. M. 1897. Metallurgist, U. S. Bureau of Mines, Room 8-407, Massachusetts Institute of Technology, Cambridge, Mass.

Gross, Leroy M., E. M. 1914. Financing of Mining Properties, 25 Broad St., New York, N. Y.

Gunther, Walter, E. M. 1921. Automobile Sales and Service, Mendham, New Jersey.

Guth, Clarence William, E. M. 1922. (919 Fourteenth St., Golden, Colorado.) Process Supervisor, Coils & Insulation, Westinghouse Club, Wilkinsburgh, Pa., Westinghouse Electric & Mfg. Co.

## H

Hackett, Cortez Perry, E. M. 1923. (210 West Kennedy St., Syracuse, New York.) Asst. Engr., Salvay Process Company, Syracuse, New York.

Hager, Edward T., E. M. 1912. (502 South Main St., Fort Atkinson, Wisconson.) Gold Hill, Utah.

Hale, General Irving, Hon. 1905. 1430 Franklin St., Denver, Colorado.

Hallett, Alfred F., E. M. 1909. (Box 18, Inspiration, Arizona.) Chief Chemist, Inspiration Consolidated Copper Co., Inspiration, Arizona.

Hallett, R. L., E. M. 1905. Chemist, National Lead Company, 105 York St., Brooklyn, New York.

Hallett, William J., E. M. 1905. Mining Engineer and Geologist, Box 219, Rock Springs, Wyoming.

Hambly, Allen Elbert, E. M. 1923. (Box 132, West Bridgewater, Mass.) Chief Sampler, United Verde Copper Company, Box 1604 Jerome, Arizona.

Hamilton, Frank R., E .M. 1898.

Hamilton, William J., E. M., 1909. Walnut, Grower, R. F. D. 1, Galeta, California.

Hammen, Charles W., E. M. 1914. Deceased.

Hammond, Herbert R., E. M. 1913. 8419 Euclid Ave., Cleveland, Ohio.

Hammond, John Hays, Hon. 1909. 71 Broadway, New York City.

Hammond, William L., E. Met. 1909. Asst. Cashier, Sagauche County Bank, Saguache, Colorado.

Hand, Edwin E. Jr., E. M. 1912. Apt. 101, Monterey, N. L., Mexico.

Hansen, Charles L., E. M. 1909. Orange Grower, Box 91, R. F. D. No. 1, Placentia, California.

Hardinge, Hal W., Hon. E. M. 1917. Pres. Hardinge Company, Inc., 120 Broadway, New York, N. Y.

Harkinson, Charles W., E. M. 1906. (1308 North 18th St., Boise, Idaho.) Assayer, U. S. Assay Office, Boise, Idaho.

Harper, Robert R., E. M. 1914. 1204 21st St., Des Moines, Iowa.

Harrington, Charles L., E. M. 1912. Mining Engineer, Idaho Springs, Colorado.

Harrington, Daniel, E. M. 1900. Consulting Mining Engineer, 507 Newhouse Bldg., Salt Lake City, Utah.

Harrington, Orville, E. M. 1898. (1485 South University Ave., Denver, Colorado.

Harris, Arnold W., E. M. 1912. Designing Engineer, Anaconda Copper Company, Box 662, Anaconda, Colorado.

Harris, Frank B., E. M. 1913. (Fierro, New Mexico.) Chief Engr., Hanover Bessemer Iron & Copper Co., Fierro, New Mexico.

Harris, Harold Avery, E. M. 1923. (2323 Mansfield Ave., Los Angeles, California.) County Surveyor's Dept., Los Angeles, California.

Harris, Harold Edwin, Geol. Engr., 1924. (Louisville, Colorado.) Foreman, Cottrell Plant, American Smelting & Refining

Company, Durango, Colorado.
Harris, Morrison, E. M. 1908. (1600 Arch St., Philadelphia, Pennsylvania.) Engr., Insurance Company of North America, 232 Walnut t,S. Philidelphia, Pa.
Harris, William F., E. M. 1901. Deceased.
Harrison, Thomas S., E. M. 1908. (1029 East 8th Ave., Denver, Colorado.) Consulting Geologist, 705 First National Bank Bldg., Denver, Colorado.
Harrod, Wayne Allen, E. M., 1916. Mining Engineer. 634 East Washington St., Fort Wayne, Indiana.
Harroun, Daniel Stuart, E. M. 1922. (Box 804, Carlsbad, New Mexico.) United Verde Copper Company, Box 1604, Jerome, Arizona.
Hartzell, Lester J., B. S. 1895. (210 South Excelsior St., Butte, Montana.) Professor Chemistry, Montana State School of Mines, Butte, Montana.
Harvey, Eugene Jairus, E. M. 1923. Deceased.
Harvey, John V., E. M. 1911. (11 West 23rd St., Sioux City, Iowa.) Cold Springs Mining Company, Ellard, Virginia.
Haselton, Charles Farnsworth, E. M. 1915. Safety Engineer, Pickands, Mather and Co. 2000 Union Trust Bldg., Cleveland, Ohio.
Haskin, Joseph A., E. M. 1922. Cr. San Francisco Mines of Mexico, H. del Parral, Chih., Mexico.
Hawley, R. Howard, E. M. 1893. Supt. Concentrator Union Miniere du Haut Katanga, Likasi-Panda, Belgian Congo, West Africa.
Hayden, Wallace H., E. M. 1914. 50 State St., Batavia, New York.
Hazard, William J., E. M. 1897. (1147 Lincoln Place, Boulder, Colorado.) Private Research, University of Colorado, Boulder, Colorado.
Heatley, Francis Eugene, E. M. 1915. 1915. 3106 High St., Denver, Colorado. Consulting Geologist.
Heaton, Charles D., E. M. 1912. (310 Mercantile Bldg., Rochester, N. Y.) Mgr. & Secy., American Rare Metals Company, Gladel, Colorado.
Height, Lewis Henry G., E. M. 1924. Asst. Foreman, Alamo Coal Company, Alamo, Colorado.
Heinrichs, Walter E., E. M. 1913. (1205 Lancaster Ave., Swinvale, Pennsylvania.) Secy.-Treas., Regent Auto Service Company, 1197 Braddock Ave., Pittsburgh, Pennsylvania.
Heitz, George Henry, E. M. 1906. (207 9th St., Huntington Beach, California.) Resident Engineer, Huntington Beach Field, Associated Oil Company, Drawer C, Huntington Beach, California.
Heitzman, Mearle G., E. M. 1917. (Park City, Utah.) Supt. Silver King Consolidated Mining Co., Silver King Coalition Mines Co., Park City, Utah.
Henderson, James Stewart, E. M. 1922. Deceased.
Hensley, James Harbison Jr., E. M. 1906. Mine Supt., Miami Copper Company, Box 100, Miami, Arizona.
Herbert, George Theodore, E. M. 1922. Deceased.
Herres, Otto Jr., E. M. 1911. (920 South 12th East Street, Salt Lake City, Utah.) Asst. to Vice Pres., United States Fuel Company, 282 Kearns Bldg., Salt Lake City, Utah.
Herron, John Cuthbert, E. M. 1923. (2050 Claudina Ave., Los Angeles, California.) Pan-American Petroleum Co., Los Angeles, Calif.
Hersey, Henry Johnson Jr., E. M. 1924. (921 East 13th Ave., Denver, Colorado.) Tonapah Belmont Development Co., Tonapah, Nevada.
Hewitt, A. F., E. M. 1905. Contracting Engineer, 1250 Pearl St., Denver, Colorado.
Hickey, Harold Nicholas, E. M. 1924. (104 South Summer Ave., Creston, Iowa.) Asst. Geologist, Producers & Refiners Corporation, Box 1002, Denver, Colorado.
Hickok, Kenneth Edward (Ulysses, Kansas.) A. S.& R. Co., Parth Amboy, New Jersey.
Hicks, Eugene Hendre, E. M. 1922. Deceased.
Hiester, Arthur J., E. M. 1912. (1340 Garfield St., Denver, Colorado.) Industrial Fuel Engineer, Public Service Company of Colorado, Denver, Colorado.
Higgins, Robert, E. M. 1917. (1225 E. 14th Ave., Denver, Colorado.) Sales Engineer, Sullivan Machinery Company, 511 Mills Bldg., El Paso, Texas.
Hill, Charles R. E. M. 1912.
Hill, Frank Culbertson, E. M. 1904. Mine Supt. U. S. Fuel Company, Hiawatha, Utah.
Hill, Myron George, E. Met. 1923. 11803 Phillips Ave., Cleveland, Ohio.
Hills, Leon P., E. M. 1908.
Hillsdale, Paul, E. M. 1912. Deceased.
Hilton, Howard J., E. M. 1910. (Rifle, Colorado.) Consulting Mining Engineer, Wolf Engineering Company, De Beque, Colorado.
Hindry, Willis., E. M. 1892. (781 Prospect Blvd., Pasadena, California.) Hindry & Boyle, Engineers, Reno National Bank Bldg., Reno, Nevada.
Hinman, Dale Durkee, E. M. 1915. (Cr. Adj. General, U. S. Army, Washington, D. C.) Caut. Co. A. C. A. Fort Monroe, Virginia.
Ho. Chieh, E. M. 1913. Professor of Mining & Met. Government University, Peking, China.
Hodgson, Arthur, E. M. 1899. (931 A St., Hayward, California.) Building & General Construction Work, Hayward, California.
Hofius, Max T., E. M. 1917. Deceased.
Hohl, Joseph Louis, E. M. 1925. (12 South Second St., Catasauqua, Pennsylvania.) Assistant Mining Engineer, Walker Mining Company, Spring Garden, California.
Hohloff, William Theodore, E. M. 1925. (Jerome, Arizona.)
Holkestad, Harold Magnus, E. M. 1924. (Golva, North Dakota.) Asst. Engr., Ontario Silver Mining Company, New Park Hotel, Park City, Utah.
Hollis, D. D., E. Met. 1907. Deceased.
Horcasitas, Jose Javier Genaro, E. M. 1921. Ave. Vincente Guero, 210, Chihuahua, Mexico.
Hornbein, Julius. E. M. 1905. Wholesale Druggist, 132 South Los Angeles, Los Angeles, California.
Houssels, John Kell, E. M. 1922.
Howat, A. M., E. M. 1907. Mine Operator, 2314 Haste St., Berkeley, California.
Howbert, Van Dyne, E. M. 1916. 22( East Espanola St., Colorado Springs, Colorado.) Field Engr., Cia Minera de Penoles, S. A., The American Metal Company, Ltd., 513 Mills Bldg., El Paso, Texas.
Hoxsie, Reginald Hamilton, E. M. 1923. (920 West 5th St., Santa Ana, California.)
Hoyt, George E., B. S. 1896. Deceased.
Hsueh, Kwei Lun, E. M. 1917.
Hu, Shih-Hung, E. M. 1916.
Huang, Jarvis Tsu-Hsiang, E. M. 1923. 38 Cross St., Peking, China.
Huang, Kuo-Yin, E. M. 1922, Pinghsiang, Colliery, Pinghsiang, Kiangsi, China.
Hubbard, John V., E. M. 1910. Horticulturist. P. O. Box 228, Grass Valley, California.
Hudson, Waller C., E. M. 1913. (Cr. B. F. Hudson, Lancaster, Kentucky.) Engr., South American Development Company, Box 655, Portonello, Ecuador, S. A.
Hughes, Earle E., E. Met. 1912. Deceased.
Hugo, Herman W., E. M. 1913. Deceased.
Huleatt, William Penn, E. M. 1921. (1905 Glencoe St., Denver, Colorado.) Asst. Prof. Geology, Colorado School of Mines, Golden, Colorado.
Hull, Cecil B., E. M. 1909. (314 South Excelsior St., Butte, Montana.) Chief Engr., Kennecott Copper Corporation, Latouche, Alaska.
Hunt, Harry V. D., E. Met. 1909. Mill Supt.
Hunt, T. R., E. M. 1905, Miami Copper Company, Box 100, Miami, Arizona.
Huntington, M. Parke, Geol. Engr. 1926. (Hot Sulphur Springs, Colorado.) Asst. Geologist, Midwest Refining Co., Denver, Colorado.
Huntington, Walter C., E. M. 1912. 3121 Lowell Blvd., Denver, Colorado.
Hurley, Keith Patrick, E. M. 1922. (P. O. Box 154, Buena Vista, Colorado.)
Hutton, John Lansing, E. M. 1925. (909 Oneida St., Denver, Colorado.) 331 Duane St., Schenectady, N. Y.
Hutton, Merritt, E. M. 1914.
Hyde, Pitt W., E. M. 1922. Box 1210, Timmins, Ontario, Canada.
Hyder, C. A., E. M. 1905. (3151 West 24th Ave., Denver, Colorado.) Asst. Mill Supt., Phillipsburg Mining Company. P. O. Box 222, Philipsburg, Montana.
Hyder, Frederic B., E. M. 1903. (5941 Keith Ave., Oakland, California.) Consulting Engineer & Income Tax Specialist, 315 Montgomery St., San Francisco, California.
Hyland, Norbert William, E. M. 1922. (2140 West 28th Ave., Denver, Colorado.) Engr. Dept., City & County of Denver, City Hall, Denver, Colorado.

# I

Ickis, Harry M., E. M. 1902. Deceased.
Ingersoll, Julius Curtis Jr., E. M. 1906 (3131 East 4th Ave., Denver, Colorado.)
Ingols, James August, E. E. 1898. (118 F St., Salt Lake City, Utah.) Chief of Administration, U. S. Veterans Bureau, 507 Boston Bldg., Salt Lake City, Utan.
Ireland, Carrol B., E. M. 1908. City Engineer, City, Hall, National City, California.
Ireland, Robert Root, E. M. 1921. (520 Windom St., Peoria, Illinois.) Asst. Const. Engr., Division of Highways, 237 N. Monroe St., Peoria, Illinois.
Irland, Burrall Hood, E. M. 1921. Patient U. S. Veteran's Bureau Hospital, Fort Lyons, Colorado.
Isom, E. W., E. M. 1907. Vice-Pres., Sinclair Refining Company, 36 Nassau St., New York, N. Y.
Ivanoff, C. L., E. M. 1926. (15 Post St., Harbin, China.)
Ivanoff, Michael I., E. M. 1925. (P. O. Box 671, Bisbee, Arizona.) Engr. Dept., C. & A. M. Co., Lowell, Arizona.
Iwai, Kyosuke, E. Met. 1909. General Manager, Komatsu Seisakusho, Komatsu Machi, Nomigun, Ishikawken, Japan.
Izett, Glenn, E. M. 1903. City Engineer, Englewood, Colorado.
Jackson, Walter H., E. M. 1901. Engr., Dixie Brick & Tile Company, Puryear, Tennessee.

# J

Jacques, Henry L., E. M. 1908. (728 South Brand Blvd., San Fernando, California.) Supt. of Construction, City of Los Angeles, Water Dept., 207 South Broadway, Los Angeles, California.
Jarvis, Royal P., E. M. 1897. Consulting Geologist, Cia Minera San Juan, Bantista, Sultepec, Mexico.
Jen, Tien Yuan, E. M. 1921. Nayang, Honan, China.
Jenni, Alfred Ernest, E. M. 1922. (1607 Palmer Ave., Pueblo, Colorado.) Draftsman, Southern Colorado Power Company, Pueblo, Colorado.
Jensen, Bertram Philip, E. M. 1924. (Baxter Springs, Kansas.)
Jewel, Gilbert E., B. S. 1893.
Joaquin, Francisco G., E. M. 1926. (1015 Oroquieta, Manila, Philippines.)
Johansen, Neil E., E. M. 1922. (913 Sixth St., Golden, Colorado.) Draftsman, Mountain States Telephone & Telegraph Co., Denver, Colorado.
Johnson, Byron M., E. Met. 1908.
Johnson, Edward W., M. E. 1891. University Club, Salt Lake City, Utah.
Johnson, Feral H., E. M. 1926. (Gray, Oklahoma.)
Johnson, Frank, E. M. 1922. Golconda Mine, Lake City, Colorado.
Johnson, Gilbert Jr., E. M. 1899. Deceased.
Johnson, Homar L., E. M. 1925. (21 Morris Ave., Athens, Ohio.) Mill Operator, Chief Consolidated Mining Company, Box 183 Eureka, Utah.
Johnson, John B., E. M. 1914. (R. F. D. No. 2, Wheeling, W. Va.)
Johnson, J. Harlan, M. S., 1923. (1220 Cheyenne St., Golden, Colorado.) Associate Professor of Geology, Colorado School of Mines, Golden, Colorado.
Johnson, Junius W., E. M. 1901. (1035 Lafayette St., Denver, Colorado.) District Engr., Bureau of Public Roads, U. S. Dept. of Agriculture, 301 Custom House, Denver, Colorado.
Johnson, Lafayette Garfield, E. M. 1904. Federal Mine and Smelter Company, Baxter Springs, Kansas.
Johnson, Ward Kendall, E. M. 1923. (Dickinson, North Dakota.)
Johnson, Fred, E. M. 1898. Route 2, Box 133, Milwaukee, Oregon.
Jones, Allan Brown, E. M. 1921. (128 S. Oak St.; Little Rock, Arkansas.) Engr., Arkansas Central Power Company, 124 West Fourth St., Little Rock, Arkansas.
Jones, David Lewis, E. M. 1922. (730 East 12th Ave., Denver, Colorado.) Salesman Kardex Rand Sales Corp., 1712 Welton St., Denver, Colorado.
Jones, Edward B., E. M. 1900. (Lehigh, Utah.) County & State Road Commissioner, Utah County, Lehi, Utah.
Jones, Ernest F., E. M. 1910. (P. O. Box 209, Eagle Pass, Texas.)
Jones, Fitzhugh Bayton, E. M. 1923. (Gloucester, Virginia.) Engr., Arthur Iron Mining Company, 326 Lincoln St., Hibbing, Minnesota.
Jones, Frank H., E. M. 1898. (P. O. Box 295, Clarkdale, Arizona.) Mgr., Bonus Dept., United Verde Copper Company, Clarkdale, Arizona.
Jones, Fred, E. M. 1900. Supt. Portland Gold Mining Co., Victor, Colorado.
Jones, Neil Merideth, E. M. 1923. (260 California St., San Francisco, California.) Gen Production Mgr., Radium Ore Revigata

Co., 319 S. Hill St., Los Angeles, California.
Jones, Percy, E. M. 1908. (R. R. 1, Box 58, Tucson, Arizona.) Box 1357, Globe Arizona.
Jones, Vincent K., E. M. 1910. (2833 Birch St., Denver, Colorado.) Vice-Pres., New Mexico Construction Company, Box 1707, Denver, Colorado.
Jones, W. Ashby Jr., E. M. 1908. (203 N. Boulevard, Richmond, Virginia.) Pres., Jones Motor Car Company, 1657 West Broad St., Richmond, Virginia.
Jones, William F., E. M. 1918. (120 Sherman St., Rock Springs, Wyoming.) Engr., Nevada Consolidated Copper Company, Box 81, McGill, Nevada.
Jordan, Charles Francis Jr., E. M. 1923. (1610 West Pike's Peak Ave., Colorado Springs, Colorado.) A. S. & R. Co., Santa Barbara, Chih., Mexico.
Joy, Hollis James Jr., E. M. 1925. (Newton, Iowa.) Assayer, Wellington Mines Company, Box 452, Breckenridge, Colorado. ColoradoV C eJjB KA8
Juchem, Harold H., E. Met. 1910. (Arvada, Colorado.) Gen. Mgr., The Aguacate Mines, Minas Aguacate, Costa Rica, C. A.
Jude, William Leonard, E. M. 1925. (12 Columbus Ave., Meriden, Conn.) The Immick Company, Meriden, Conn.

# K

Kaanta, Henry W., E. M. 1915. (1112 Mills Bldg., El Paso, Texas.) San Francisco del Oro Mine, Ltd., San Francisco del Oro Chih., Mexico.
Kaufman, Godfrey Frensz, E. M. 1921. (Box 174, Montague City, Mass.) Tampico, Tamps., Mexico.
Kay, Fred Duckworth, E. M. 1921. (Cr. J. D. Kay, 217 Farewell Bldg., Detroit, Michigan.)
Keating, Paul H., E. M. 1921. (425 West 17th St., Pueblo, Colorado.)
Keeney, Robert M., E. Met. 9110. (Somersville, Connecticut.) Industrial Heating Engineer, Westinghouse Electric & Manufacturing Company, 10 High St., Boston, Mass.
Keightley, Walter Allison, P. E. 1923. (Belleview, Illinois.)
Kell, Wayne S., E. M. 1906. (729 Sycomore St., Decatur, Georgia.) Asst. to Executive Vice-Pres., Coca-Cola Company, P. O. Box 1734, Atlanta, Georgia.
Keller, Howard Frederick, E. M. 1924. (29 Leverett St., Fredonia, New York.) Stope Engr., Cananea Cons., Copper Co., Cenanea, Sonora, Mexico.
Kelley, Fred G., E. M. 1899.
Kelley, William A., E. M. 1897. Deceased.
Kelso, Duane C., E. M., E. Met. 1910. (321 Park St., Fort Collins, Colorado.) Union Oil Company, Box 67, R. 2, Fort Collins, Colorado.
Kennedy, George A., E. M. 1895. 2741 Federal Blvd., Denver, Colorado.
Kenner, Alvin R., E. M. 1907. Deceased.
Keough, Otis Edmund, E. M. 1921. (Box 429, Tooele, Utah.) Asst. Concentration Engr., International Smelting Company, Tooele, Utah.
Kerr, Victor E., E. M. 1900. Deceased.
Kessler, David Lowell, Geol. Engr., 1925. (2073 South Clarkson St., Denver, Colo.) Asst. Engr., Moffat Coal Company, Oak Creek, Colorado.
Kiesel, Albert H., E. M. 1921. (Ouray, Colorado.) Resident Engineer, Colorado State Highway Dept., Box 824, Durango, Colorado.
Kiess, Myron Christopher, Geol. Engr. 1925. (R. R. 8, Bucyrus, Ohio.) Geologist, Pure Oil Co., Box 336, Chandler, Okla.
Kilbourn, Burwell N., E. M. 1913. (2570 Whitmore St., Omaha, Nebraska.) Gen. Supt., Omaha Plant, American Smelting & Refining Company, Omaha, Nebraska.
Kilbourn, William D., M. E. 1904. (Sapinero, Colorado.) Pres., White Iron Ore & Products Company, Sapinero, Colorado.
Kilgour, Hamilton, E. M. 1908.
Kimball, George K., E. M. 1892. (Idaho Springs, Colorado.)
Kimball, Harlow McConnell, E. M. 1904. Architect, 1255 Vista St., Los Angeles, California.
Kimball, Joseph S., E. M. 1892. Central City, Colorado.
King, Henry E., E. M. 1903.
Kingman, Jerry, E. M. 1888. Deceased.
Kinsley, Arthur C., E. M. 1920. (Alameda, California.) Inspector, U. S. General Land Office, 512 Custom House, San Francisco, California.
Kintz, George Morton, E. M. 1920. (1322 Madison St., Denver, Colorado.) U. S. Mineral Examiner, General Land Office, Oil Shale Dept., 323 Post Office Bldg., Denver, Colorado.
Kirby, Frederick White, E. M. 1922. (202 North Madison St., Staunton, Virginia.) Office Mgr., Goodman Mfg. Co., Charleston, W. Virginia.
Kirchmann, Robert L., E. M. 1909. Mine Operator, Box 147, Silver City, New Mexico.
Kissock, Alan, E. M. 1912. Climax Molybdem Co., 61 Broadway, New York, N. Y.
Klaman, Albert Anton, E. M. 1920. (800 South Lipan St., Denver, Colorado.
Klatt, Carl L., E. M. 1914. (615 Thirteenth St., Golden, Colorado.) Marine Oil Company, Box 458, Midwest, Wyoming.
Kleeman, Albert Pascal, E. M. 1924. (641 South Ash St., Casper, Wyoming.)
Kleff, J. Marvin, E. M. 1906. Mining Engineer, Leadville, Colorado.
Knepper, Chester M., E. M. 1917. Deceased.
Knight, Hal G., E. Met. 1908. (654 West Market St., Akron, Ohio.) Gen. Mgr., Rubber City Sand & Gravel Co., 999 East Market St., Akron, Ohio.
Knight, R. E., E. Met. 1907. Asst. Cashier, Alliance National Bank, Alliance, Nebr.
Knill, Raymond R., E. M. 1923.
Knowles, Benjamin W., E. M. 1908. (1320 Detroit St., Denver, Colorado.) Supt. Mine, Hedley Gold Mining Co., Ltd., Hedley, B. C., Canada.
Koch, William F., E. M. 1911. (167 First Ave., Salt Lake City, Utah.) Sales, Explosives & Naval Stores, Hercules Powder Company, 618 Kearns Bldg., Salt Lake City, Utah.
Koelker, Karl L., E. M. 1914. Consulting Engineer, 230 Frisco Bldg., Joplin, Missouri.
Koerner, Albert J., E. M. 1906. (1122 South Michigan Ave., Saginaw, S. W. Michigan.) Resident Mgr., The Strauss Corporation, Investment Bonds, 611 Bearinger Bldg., Saginaw, Michigan.
Kraemer, Edward L., E. M. 1898. Deceased.
Krantz, Percy R., E. M. 1923. (Dunton, Colorado.) Rico, Colorado.
Krekel, Edward Carl, E. M. 1926. Deceased.
Krier, Edward J., E. M. 1920. (Walsenburg, Colorado.)
Krieger, Franklin Odell, P. E. 1295. Chief Engr., Buboil Refining Company, 2940 Terrace St., Kansas City, Mossouri.
Krohn, Arthur, E. M. 1914. ("The Hemlock," Eagle River, Wisconsin.) Secy.-Treas., The Hemlock Company, Eagle River, Wisconsin.
Krueger, George S., E. M. 1907. (Park City, Utah.) Supt. Mines, Park City Mining & Smelting Company, Park City, Utah.
Kruger, Herman A., E. M. 1909. Supt. Florence Lake Project, Southern California Edison Company, Big Creek, California.
Krumm, Samuel Z., E. M. 1914. Case School of Applied Science, Cleveland, Ohio.
LoFollette, Bruce Benedict, E. Met. 1922. (3880 Meade St., Denver, Colorado.) Empire Zinc Company, Gilman, Colorado.

# L

Laist, Frederick, Hon. 1921. (218 West 7th St., Anaconda, Montana.) Gen. Metallurgical Manager, Anaconda Copper Mining Company, Anaconda, Montana.
Lampe, Oscar A., E. M. 1898. Mill & Cyanide Supt., Guanajuato Consolidated Mining and Milling Company, Apartado 33, Guanajuato, Gto., Mexico.
Langrall, Charles A., E. M. 1908. (101 West 39th St., Baltimore, Maryland.) Secy. Treas., Atlantic Can Company, 2108 Boston St., Baltimore, Maryland.
Lannon, F. P., Jr., E. Met. 1907. Gen. Supt., U. S. Oklahoma & Texas Plants, U. S. Zinc Company, Sand Springs, Oklahoma.
Lannon, James A., E. M. 1911. Deceased.
Larison, E. L., E. M. 1905. (221 West 3rd St., Anaconda, Montana.) Supt. Acid & Phosphate Plants, Anaconda Copper Mining Company, Anaconda, Montana.
Larsh, Walter Stuart, E. M. 1904. General Supt. Mines, Nevada Consolidated Copper Co., Ruth, Nevada.
Larson, Carrel Blaine, E. M. 1923. (915 Washington St., Boise, Idaho.) Miner, United Verde Copper Company, Box 1604, Jerome, Arizona.
Larson, Edward S., E. Met. 1923.
Larson, William M., E. M. 1925. (209 J St., Fort Dodge, Iowa.)
Lasky, Samuel, E. M. 1922. (611 Marion St., Denver, Colorado.) Kennecott Copper Company, Kennecott, Alaska.
Latimer, Bertrand J., E. M. 1910. Supt. Nebraska Cement Company, Superior, Nebraska.
Laughlin, Samuel W., E. M. 1910.
Laurance, Bert M., E. Met. 1911.
Lavender, Harrison Morton, E. M. 1916. (936 East 12th Ave., Denver, Colorado.) Chief EnCalumet & Arizona Mining Company, Warren, Arizona.
Laverty, Frank James, P. E. 1925. (1776 South Corona St., Denver, Colorado.)
Lawrence, Henry Waldon, E. M. 1923. (West Stockbridge, Mass.), Box 1824, Bisbee Arizona.
Leach, Paul Raymond, E. M. 1922. (No. N. Apt., 23 W. 61th St., Indianapolis, Indiana.) Supt., Golconda Mines, 801 Guaranty Bldg., Indianapolis, Ind.
Leahy, Richard A., E. M. 1913. Mill Supt., St. Joseph Lead Company, Box 273, Leadwood, Missouri.
Lee, Frank W., Jr., E. M. 1911.
Lee, George M. E. Met. 1910. (1704 Bannock St., Boise, Idaho.) Asst. Smelter Supt., Granby Cons. M. S. & P. Co., Box 153, Anyox, B. C., Canada.
Lee, Henry Raymond, E. M. 1923. (900 Garden St., Bellingham, Washington) Los Angeles Gas & Electric Corporation, 833 S. Grant Ave., Los Angeles, California.
Lee, Hunyet, E. M. 1916. (Tsaoshouhutung, Shunchinannel, No. 12, Pekin, China.
Lee, Ping,, E. M. 1914.
Lee, Robert P., E. M. 1905. **Deceased.**
Lee, Wallace, E. M. 1904. (6510 Ellenwood Ave., St. Louis, Mo.) P. V. Petroleum Co., Pecos, Texas.
Lee, Yu-Ching, E. M. 1921. Mia-Ling, Hsiangching, Csieu, Honan, China.
Leeke, Dana W., E. M. 1910. (615 North Fern Ave., Ontario, California.) 2428 Bancroft Way, Berkeley, California.
Lehmer, Frank Welton, E. M. 1902. (Lingle, Wyoming.) Mgr., Santo Domingo, Motors Co., Santo Domingo, R. D.
Lehnertz, Clement Arthur, E. M. 1924. (5475 Vernon Ave., St. Louis, Missouri.) Asst. Engr., St. Joseph Lead Company, Box 809, Bonne Terre, Missouri.
LeMaire, George Widson, P. E. 1926. (24 W. 31st St., Bayonne, New Jersey.)
Lemke, Carl, E. M. 1900. Mill Supt., U. S. Smelting Co., Midvale, Utah.
Lennox, Luther W., E. M. 1905. (Colorado Springs, Colorado.) Mill Supt., American Smelting & Refining Company, Parral, Chih., Mexico.
Lerchen, F. H., E. M. 1897. (2806 Rock Glen Ave., Eagle Rock, California.) Gen. Supt., & Asts. Mgr., El Fuerte Mining & Smelting Company, Choix, Sinaloa, Mexico.
Lesh, Herbert B., E. M. 1910. Deceased.
Lesher, Carl E., E. Met. 1908. Asst. to Pres., Pittsburgh Coal Company, Oliver Bldg., Pittsburgh, Pennsylvania.
Levings, William Stephen, E. M. 1920. (752 Elizabeth St., Denver, Colorado.)
Levis, Alfred C., E. M. 1917. (907 Roland Ave., Baltimore, Maryland.) Sales Mgr., Stearns Motor Car Company, Mt. Royal & Maryland Aves., Baltimore, Md.
Levy, Milton Mortimer, E. M. 1916. c|o Whitmore Hotel, 2nd & Figuerou St., Los Angeles, California.
Lewis, Alfred S., E. M. 1905. (305 North Emporia Ave., Wichita, Kansas.) Consulting Engineer, 307 North First St., Phoenix, Arizona.
Lewis, Frank E., E. M. 1901. (1007 South Race St., Denver, Colorado.) Engr., & Asst. Supt., Chisas Mining Company, Terlingua, Texas.
Lewis, William B., M. E. 1892. Pres., Oakdale Coal Company, 40 Wall St., New York, N. W.
Lewis, William M., E. M., E. Met. 1909. (6315 Ogontz Ave., Philadelphia, Pennslyvania.)
Libby, James L ., E. M. 1906. (709 East 21st St., Cheyenne, Wyoming.) Asst. Chief Engr., Union Pacific Coal Company, No. 8, Wardell Court, Rock Springs, Wyoming.
Lichtenheld, Frederick Albert, E. M. 1920. (4161 Julian St., Denver, Colorado.) Associate Petroleum Engineer, U. S. Geological Survey, Fort Washakie, Wyoming.
Liddell, Charles A., E. M. 1903. U. S. Mineral Surveyor & Mining Engineer, Box 517, Tonopah, Nevada.
Liddell, Parker, E. M. 1903. Mining Engineer, Box 414, Reno, Nevada.
Light, Victor A., E. M. 1915. Resident Agent & Superintendent Leases, Tom Reed Gold Mines Company, Oatman, Arizona.
Limbach, Edmund C., E. M. 1895. Deceased.
Linburg, Elmer E., E. M. 1924. (614 136th St., Apt. 21, New York, N. Y.) Engr. with Research Institute, Combustion Utilities Corporation, 366 Gerard Ave., Bronx, New York.
Lindenholm, Carl Tura, E. M. 1924. (321 Edison Ave., Alamosa, Colorado.)
Link, Karl G., E. M. 1908. (1641 Gaylord St., Denver, Colorado.) Rehabilitation Asst., U. S. Veterans Bureau, 838 U. S. National Bank Bldg., Denver, Colorado.
Linn, Herbert Karl, E. M. 1920. (4509 Perry

St., Denver, Colorado.) Engr., Societe International Forestiere et Miniere, Cr. Forminiere, Tshikapa, Kasai, Dist., Congo, Belge, Africa.

Litchfield, Rufus E., E. M. 1914. (222 High St., Lockport, New York.) Clerk, Simons Manufacturing Company, Lockport, New York.

Litheredge, Robert W. Jr., E. M. 1923. (1310 South Cherry St., Casper, Wyoming.)

Litheredge, Roland Thomas, E. M. 1922. (1310 South Cherry St., Casper, Wyoming.) Field Engr., General Petroleum Oil Company, 966 South Hoover St., Los Angeles, California.

Liu, Chung-Han, E. Met. 1925. (2312 19th St., N. W., Washington, D. C.

Literas, John Manuel, E. M. 1916.

Locke, David Roger, E. M. 1920. Box 883, San Antonio, Texas.

Logue, N. W., E. M. 1897. Chief Engineer, A. S. & R. Co., Hayden, Arizona.

Loh, Ping-Hang, E. Met. 1925. (Cr. N. I. Yoh, The Yih Dah Trust Co.) P 20, Nanking Road, Shanhhai, Chine.

Lonergan, P. Jay, E. M. 1905. (238 North Wenatchee, Wenatchee, Washington.) Chief Engr., Royal Development Company of Montana, 5 Leavenworth, Washington.

Lorah, Bela I., E. M. 1888. Deceased.

Lorence, Walter Ernest, M. S. 1923. 1st Lt. Corps of Engrs. U. S. Army, Quarters 5B, Fort Santiago, Manila, P. I.

Lovering, Ira G., E. M. 1901. (3529 Grove St., Denver, Colorado.) Supt. Washery Dept., Stag Canon Branch, Phelps-Dodge Corporation, Box 1133, Dawson, New Mexico.

Low, Albert Howard, Hon. Sc. D. 1922. (911 East 13th Ave., Denver, Colorado.) Professor of Chemistry, Colorado School of Mines, Golden, Colorado.

Lowe, Rupert Bidwell, E. M. 1922. (82 Market St., Perth Amboy, New Jersey.) Engr., Bakelite Corporation, Perth Amboy, New Jersey.

Lowell, James B., E. M. E. Met. 1908. (4 Burgess Road, Worchester, Mass.) Member Firm, Lowell-Whipple Company, 44 Portland St., Worchester, Mass.

Lowenstein, Harry, E. M. 2913. (Roanoke, Virginia.)

Lu, Robert P., E. M. 1922. Middle School, Shanghai, China.

Lucy, Frank Allen, E. M. 1901. Deceased.

Lucy, Robert W., C. E. 1898. Deceased.

Luke, Russell P., E. M. 1914. (Cr. Dr. J. E. Scheifly, 284 Wyoming Ave., Kinston, Pa.) Mining Engr., Sombrete Mining Company, A. S. & R. Co., Sombrete, Zacatecas, Mexico.

Lynch, Victor John, E. M. 1920. (530 W. Bijou St., Colorado Springs, Colorado.)

Lynne, (Levy) Archibald L., E. M. 1906. (143 Fuller Lane, Winnetka, Illinois.) Vice-Pres., Elevator Company of America, 1216 State Lake Bldg., Chicago, Illinois.

# M

MacGregor, George H., E. M. 1897. Terrebonne, Oregon.

Machamer, George William, E. M. 1921, M. S. 1922. Instructor in Geology, Colorado School of Mines, Golden, Colorado.

MacKay, Donald R., E. M. 1912.

Maddock, Edward Goynne, E. M. 1924.

Magenau, William, E. M. 1898. Deceased.

Mahood, George Phillips, E. M. 1924. (1320 Park Ave., Lynchburg, Virginia.) Bethlehem Steel Company, 327 Walnut St., Steelton, Pennsylvania.

Malmstrom, C. Clarence, E. M. 1900. (864 Harrison St., Denver, Colorado.) Assayer U. S. Mint, Denver Colorado.

Mann, John Raoul Charles, E. M. 1924. (947 19th St., San Pedro, California.) Grass Valley, California.

Marks, John H., E. M. 1925. Mining Engineer, 504 Bank Bldg., Denver, Colorado.

Marrs, George Oliver, E. M. 1901. (1570 Detroit St., Denver, Colorado.) Instructor in Mathematics, 212 Kittredge Bldg., Denver, Colorado.

Marshall, Emory M., E. M. 1911. 788 Mills Bldg., San Francisco, California.

Martin, Armor Beardslee, E. M. 1923. (Martinsdale, Montana.) Foreman, Mascot No. 1 Mine, American Zinc Company of Tennessee, Mascot, Tennessee.

Martin, Carleton Charles, E. M. 1923. (Martinsdale, Montana.) Silver Dyke Mining Company, Neihart, Montana.

Martin, Jack A., E. M. 1926. (1601 Cook Ave., Raton, New Mexico.)

Martin, J. A., E. M. 1907. Deceased.

Martinez, y Castilla Fidel, E. M. 1913. Matamaras No. 262, Monterrey, N. L., Mexico.)

Marvin, Theodore, E. M. 1922, M. S. 1923. (4404 Greenwood Ave., Chicago, Illinois.) Managing Editor, The Explosives Engineer, Wilmington, Delaware.

Matheson, Kenneth H., E. M. 1911. (2082 Ogden St., Denver, Colorado.) Acting Mgr., New York Honduras Rosario Mining Co., San Juancito, Honduras, C. A.

Mathews, Harvey, E. M. 1913. (1106 Cheyenne St., Golden, Colorado.) Sales Engineer, Stearns-Rogers Manufacturing Company, 1720 California St., Denver, Colorado.

Mathewson, E. P. Hon. 1920. (33 Richmond Ave., Arrochar, Staten Island, New York.) Professor of Mine Administration, University of Arizona, Tucson, Arizona.

Matteson, Wallace G., E. M., E. Met. 9111. Consulting Petroleum Engineer, Box 376, Center Moriches, New York.

Mattson, Vernon Linnaeus, E. M. 1926. (2 Washington St., South Charleston, Virginia.)

Maxson, Walter Landon, M. S. 1923. (1000 Twelfth St., Golden, Colorado.) Associate Professor Metallurgy, Colorado School of Mines, Golden, Colorado.

Maxwell, Fred A. G., E. M. 1895. (Box 1242, Johannesburg, South Africa.) General Mining & Finance Corp., Ltd., Consulting Metallurgist, Johannesburg, South Africa.

Maxwell, Norman E., E. M. 1917. (Golden, Colorado.)

Maxwell, Ralph C., E. M. 1925. Compania Minera de Penoles, S. A., Apt. 93 Torreon, Coah., Mexico.

May, Andrew J. Jr., E. M. 1912. (University Club, Salt Lake City, Utah.)

May, Arthur L., E. M. 1911. (1026 Ninth Ave., Beaver Falls, Pennsylvania.) Secy.-Treas., & Supt., Beaver Enameling Company, Ellwood City, Pennsylvania.

May, John G., E. M. 1901. Deceased.

May, Ross R., E. M. 1912. (613 West Abriendo Ave., Pueblo, Colorado.) Dayton Morgan Engineering Company, Box 442, Pueblo, Colorado.

Mayer, Walter, E. M. 1922. (4892 North Kedzie Ave., Chicago, Illinois.) Estimator Olney J. Dean & Co., 137 S. La Salle St., Chicago, Illinois.

Mayer, Walter J., E. M. 1911. Insurance Broker, 889 Monadnock Block, San Francisco, California.

Mayhguh, Dorsey E., E. M. 1921. (2126 Elizabeth St., Pueblo, Colorado.)

Maynard, Rea E., E. M. 1896. Vice-President & Director, Pipe Line Transportation, General Petroleum Corporation, 1003 Higgins Bldg., Los Angeles, California.

McBrian, Joe, E. M. 1923. (521 N. Aydlotte, Shawnee, Oklahoma.) Compania Minera de Penoles, S. A., Unidad Achotla, Campo Morado, Guerrero, Mexico.

McCallum, Jean, E. M., E. Met. 1910. (3775 Osceola St., Denver, Colorado.) Asst. Supt., River Smelting & Refining Company, Florence, Colorado.

McCart, Robert Jr., E. M. 1905. Consulting Mining Engineer, 222 Mills Bldg., El Paso, Texas.

McConnell, Harold, E. M. 1926. (Torpedo, Pennsylvania.)

McCormick, David F., E. M. 1910. (716 West Cypress St., San Antonio, Texas.) Mgr., Cold Springs Mining Co., Ellard, Virginia.

McCormack, Maxwell L., E. M. 1926. (911 S. Illinois St., Carbondale, Illinois.)

McCune, Paul, E. M. 1924. (6039 Oakwood Ave., College Hill, Cincinnati, Ohio.) Geologist, Midwest Refining Co., Denver, Colo.

McDaniel, Alexander K., E. M. 1901. (700 Franklin St., Denver, Colorado.) 901-2 Foster Bldg., Denver, Colorado, Consulting and Metallurgical Engineer.

McDermutt, Grace C. U., E. M. 1903. (Mrs. Barry Mulligan, 3219 13th St., N. W., Washigton, D. C.) Asst. Physicist, Bureau of Standards, Washington, D. C.

McDonald, Jesse F., Hon. 1905. President, American National Bank, Leadville, Colorado.

McElvenny, Robert, F., E. M. 1903. (780 Elizabeth St., Denver, Colorado.) A. S. & R. Company, Equitable Bldg., Denver, Colorado.

McGhee, John S., E. M. 1926. (317 Penn. Ave., Wellston, Ohio.)

McGill, William Mahone, E. M. 1922. (42 South Market St., Petersburg, Virginia.) Geologist, Marland Oil Co., Patterson Bldg., Denver, Colorado.

McGlone, Edward Seyferth, E. M. 1923. (203 Virginia Apts., Butte, Montana.) Asst. Foreman Anaconda Copper Mining Company, Butte, Montana.

McGowan, Harold Welch, E. M. 1923. (519 East Tennessee St., Denver, Colorado.) 603A South Catalina Ave., Redondo Beach, California.

McGregor, M. G. S., E. M. 1913. (603 E. Micheltorena St., Santa Barbara, California.)

McGuire, Phillip Jenner, E. M. 1915. (953 Central Bldg., Los Angeles, California.) United Filters Corporation.

McHugh, Philip M., E. M. 1911. President Petree & Dow, Engineers, Inc., 67 Wall St., New York, N. Y.

McKay, Glover S., E. M. 1910. (Townsend, Montana.) Supt., Calera Mining Company, San Isidor, Chih., Mexico.

McKenna, William J., E. M. 1921. (Tooele, Utah.) Concentration Dept., International Smelting Co., Tooele, Utah.

McKenzie, William Carlton Jr., E. M. 1922. (Moultrie, Georgia.) Engr., T. C. I. & R. R. Co., 1812 Clarendon Ave., Bessemer, Alabama.

McKinless, Frank Vincent Jr., E. M. 1923. (1621 E. 15th St., Brooklyn, N. Y.) Ingersoll-Rand Company, 11 Broadway, New York, N. Y.

McKinless, Raymond, E. M. 1925. (1621 E. 15th St., Brooklyn, N. Y.)

McKnight, Hugh Stewart, E. M. 1915. (1003 E. California St., El Paso, Texas.)

McLeod, J. Norman, E. M. 1897. Ecsondido, California.

McMahan, Charles H., E. M. 1892. (1217 Adams St., Denver, Colorado.) Secy.-Treas., Yale Laundry Comapny, 2417 Curtis St., Denver, Colorado.

McMenemy, James Peter, E. M. 1922. (4624 Clay St., Denver, Colorado.)

McNeill, Harry Lee, E. M. 1924. (461 Fort Washington Ave., New York, N. Y.) Shift Boss, Kennecott Copper Company, Kennecott, Alaska.

McNeill, Neil M., E. M. 1914. (Woodrow, Colorado.)

McNicholas, Frederick S., E. M. 1914. (Cr. Judge W. L. Lippincott, Butte, Montana.) Efficiency Engr., Butte Superior Mining Company, Butte, Montana.

McWhorter, Cedric Edward, E. M. 1924. (2272 Eudora St., Denver, Colorado.) Engr., Goodman Mfg. Company, 4568 Oakenwald Ave., Chicago, Illinois.

McWhorter, William Sprenger, E. M. 1923. (2272 Eudora St., Denver, Colorado.) International Smelting Co., East Chicago, Indiana.

Mechin Rene Jean E. M. 1919. (5088 Raymond Ave., St. Joseph Lead Company, Asst. Mine Captain, Box 1291, River Mines, Missouri.

Medell, William S., B. S. 1908. (Deans, New Jersey.) Supt. Factory, Stanley Chemical Company, No. 1, Union Square, New York, N. Y.

Mehan, Michael P., E. M. 1924.

Meng, Hsien-Min, Geol, Engr. 1925.

Merryman, Herbert E., E. M. 1895. (441 South 7th St., Montrose, Colorado.) Mining Engineer, Montrose, Colorado.

Mertes, Albert T., E. M. 1912. (830 Bush St., San Francisco, California.)

Merwin, Eugene W., E. M. 1903. (837 Irland Ave., Wilmington, California.)

Metzger, Otto H., E. M. 1919.

Mewhirter, Sydney A., E. M. 1917. (1508 East 8th St., Pueblo, Colorado.) Cia Minere de Penoles, Ojuela, Dgo., Mexico.

Michaels, Frank Lewis, E. M. 1925. (206 Wallace Ave., Covington, Kentucky.

Middlecamp, L. L., E. M. 1905. Engineer, Cinco Minas, Jal., Mexico.

Middleton, William B., E. M. 1863. Deceased.

Millar, Wilton Tisdale, E. M. 1922. (Front Royal, Virginia.)

Millard, Frank W., E. M. 1901. Mining Engineer, Ely, Nevada.

Miller, Alvah L., E. M. 1917. Crown Willamette Paper Co., 248 Battery St., San Francisco, California.

Miller, Bernhardt Adam, E. Met. 1926. (2405 W. 35th Ave., Denver, Colorado.)

Miller, DeMont G., E. Met. 1909. (2201 Oak St., South Pasadena, California.) Asst. Gen. Mgr., Layne & Bowler Corporation, 900 Santa Fe Ave., Los Angeles, California.

Miller, Elmer DeForrest, E. M. 1924. (Cr. Dr. W. L. Miller, Delano, California.)

Miller, Graham Robson, E. M. 1924. (108 E. 6th St., Trinidad, Colorado.) Woodward, Iron Co., Woodward, Alabama.

Miller, Guy, E. M. 1919.

Miller, Harold Hudson, E. M. 1921. (39 E. Princeton Ave., Youngstown, Ohio.)

Miller, Hugh, Chem. Engr., 1925. (2829 Stuart St., Denver, Colorado.) 308 Carpenter Lane, Germantown, Philadelphia, Pa.

Miller, Milward, Geol. Engr., 1926. (3235 W. 22nd Ave., Denver, Colorado.)

Miller, Roy Harrison, E. M. 1915. Asst. Supt. Copper Furnace Refinery, Anaconda Copper Mining Company, Box 1701, Great Falls, Montana.

Milliken, John Tait, E. M. 1896. Consult-

ing Mining Engineer and Metallurgist, 1615 North Cascade Ave., Colorado Springs, Colorado.
Milliken, William B., E. M. 1893. 8 02 Patterson Bldg., Denver, Colorado.
Minister, Howard Leslie, E. M. 1916.
Mitchell, George B., C. E., 1896. (University Club, Montreal, Canada.) Western Mgr., P. Lyall & Sons Const. Co., Ltd., P. O. Box 668, Victoria, B. C.
Mitchell, George W., E. M. 1923. (2434 Bryant St., Denver, Colorado.) Jigger Boss, United Verde Copper Company, Box 1970, Jerome, Arizona.
Montague, Harley Howard, E. M. 1926. (1025 12th St., Golden, Colorado.)
Montrose, James Fay, E. M. 1902. (Newhouse Hotel, Denver, Colorado.) Owner, J. K. Montrose & Sons, 1631 Market St., Denver, Colorado.
Moore, Carl A., E. M. 1912. Mill Supt., The Empire Zinc Company, Hanover, New Mexico.
Moore, C. F., E. M. 1907. Deceased.
Moore, George P., E. M. 1907. (169 Oakland St., Briston, Conn.) Metallurgist, Wallace Barnes Company, Bristol, Connecticut.
Moraes, Jose Emirio de, E. M. 1921. State of Minas Geraes, Ruo Barao du Triumpho 295, Recipe, Pernambuco, Brazil.
Moreno, Domingo, E. M. 1922.
Morrison, Jewel E., E. M. 1926. (3894 Steel St., Denver, Colorado.)
Moses, Percival S., E. M. 1914. (802 Maupas Avenue, Savannah, Georgia.) Supt. Savannah Factory, G. Ober & Sons Co., of Baltimore, Maryland. Box 995, Savannah, Georgia.
Moss, Cleveland Osgood, E. M. 1902. (1750 Williams St., Denver Colorado.) Geologist, Stratton Lease, P. O. Box 385, Victor, Colorado.
Mossman, Howard William, E. Met. 1922. Testing Engr., International Smelter, Box 1756, Miami, Arizona.
Moynahan, Ambrose Edwin, E. M. 1900. (1401 East St., Golden, Colorado.) Consulting Engineer, Symes Bldg., Denver, Colorado.
Mueller, Nathanael Jeremias, P. E. 1922.
Muir, David R., E. M. 1899. Mgr., U. S. Smelting, Refining & Mining Company, Goldroad, Arizona.
Muir, Douglas, E. M. 1905. No. 1742, 30 Church St., New York, N. Y.
Mulford, Loren D., E. M. 1919. (Box 63, Gardena, California.) Junior Draftsman, County Surveyor, 702 Hall of Records, Los Angeles, California.
Mullen, Donald Harrington, E. M. 1925. (3115 Meode St., Denver, Colorado.)
Munn, Harold E., E. M. 1917. (216 South Chester St., Pasadena, California.)
Murch, Clarence H., E. M. 1908. Deceased.
Murch, Thompson H., E. M. 1923. Sales Engr., Colonial Steel Company, 308 Kearns Bldg., Salt Lake City, Utah.
Murchison, Earl H., E. M. 1912. (Arvada, Colorado.) Supt. of Mines, National Pigments & Chemical Co., Potosi, Missouri.
Murphy, William J., 1917. 35 Lebanon St., Springfield, Mass.
Myers, John F., E. M. 1913. (6710 Fennimore St., Pittsburgh, Pennsylvania.) Metallurgist Western Mills, Empire Zinc Company, Canon City, Colorado.

## N

Nachtman, Jack, E. Met. 1922. (733 Monmouth, Trenton, New Jersey.)
Nagel, Frank J., E. M. 1903. (855 Humbolt St., Denver, Colorado.) Consulting Engineer, 222 U. S. National Bank Bldg., Denver, Colorado.
Nagel, Henry P. Jr., E. M. 1904. (674 Franklin St., Denver, Colorado.) Consulting Engineer, 222 U. S. National Bank Bldg., Denver, Colorado.
Nance, William H., E. M. 1896.
Neiswender, Chester B., E. M. 1913. (1816 Spruce St., South Pasadena, California.) General Insurance Broker, 806 Title Insurance Bldg., Los Angeles, California.
Nelson, Arthur N., E. M. 1926. (Fertile, Minnesota.) Engineer A. S. & R. Co., Perth Amboy, N. J.
Nelson, Fred Merriam, E. M. 1925. (1110 South 9th St., St. Joseph, Missouri.) Roxana Petroleum Company, 543 First National Bank Bldg., Houston, Texas.
Nelson, H. E., E. M. 1897.
Neugebauer, Karl Endress, E. M. 1906. (1130 West 15th St., Pueblo, Colorado.) Draftsman, City of Pueblo, City Engineer's Office, Pueblo, Colorado.
Neumann, Gustave Lee, E. M. 1921. (3254 Josephine St., Denver, Colorado.) Nevada Consolidated Copper Company, Box 334, Ruth, Nevada.
Neville, J. B. Jr., E. M. 1905. (836 Odgen ?St., Denver, Colorado.)
Newman, William E., B. S. 1896. Supt. St. Louis Smelting & Refining Co., Collinsville, Illinois.
Nibur, Frederick R., E. M. 1921. (123 19th St., Brooklyn, New York.) Mgr., New York Rating Office, The National Bureau of Casualty & Surety Underwriters, 13 Park Row, New York, N. Y.
Nicolson, George W., E. M. 1900. United Verde Extension Co., Jerome, Arizona.
Nieman, Earl F., E. M. 1913.
Niemi, William Jack, E. M. 1926. (Eska, Alaska.)
Nix, Dale, P. E. 1926. (R. R. No. 3, Ponca City, Oklahoma.)
Nolan, Philip E., E. M. 1913. Geologist, Venzuela Gulf Oil Co., Maracaibo, Venzuela.
Norman, John E., E. M. 1898. (Route 1, Box 76, Broomfield, Colorado.) Mining Engineer, 1267 Race St., Denver, Colorado.
Norris, Will Victor, E. M. 1921, Sc. D. 1922. 1760 Illinois St., Golden, Colorado.) General Mgr., Real Estate Dept., Olinger Corp., Denver, Colorado.
Norton, A. C., E. M. 1907. (1520 Tacoma, Ave., Berkeley, California.)
Nufio, Gustave A., E. M. 1918. c|o New York, Honduras and Rosario Mining Co., New York, N. Y.
Nyberg, H. Edward, E. M. 1906. Gen. Mgr., Cia Minera "Las Dos Estrellas," S. A., Mineral de Dos Estrellas, Michoacan, Mexico.
Nye, Robert, E. M. 1897. Grass Valley, California.
Nylund, Emil Jack, E. M. 1925. (DeBeque, Colorado.) Engineer and Bookkeeper, Akron Mines Company, Whitepine, Colorado.

## O

O'Byrne, Joseph F., E. M. 1905. (1703 Ford Street, Golden, Colorado.) Professor Descriptive Geometry, Colorado School of Mines, Golden, Colorado.
O'Connor, John H., E. M. 1926. (956 Franklin Ave., Columbus, Ohio.)
Oliveros. Reginald P., E. M. 1917. (5003 Fernwood Ave., Detroit, Michigan.)
Olsen, Charles O., E. M. 1911. (E. 1103 Providence Ave., Spokane, Washington.) Mining Engineer, 301 Mohawk Bldg., Spokane, Washington.
Olson, Van Cleave Arthur, E. M. 1915. (Patient, U. S. Veterans Hospital No. 86, Sheridan, Wyoming.)
O'Neill, James Francis, E. M. 1924. (418 East Second St., Leadville, Colorado.) Foreman, Gossan Mines, Monarat, Va.
Oram, Charles F., E. M. 1913. (Cr. Mrs. J. E. Tubbs, Golden, Colorado.) Keota, Colorado.
Ornelas, Ernesto, E. M. 1920. (Gomez Farias 63, Mexico, D. F., Mexico.) Chief Engr., El Potosi Mining Company, Apartado 13, Chih., Mexico.
Oritz, Salvador Davila, E. M. 1923. (Eje Ponieuti No. 420, Guadalajaia, Mexico.) Cr. Departmento Geologico, Husteco Petroleum Company, Elbano, S. L. P., Mexico.
Osborne, Arthur H., E. M. 1893. Deceased.
O'Toole, Arthur Lawrence, E. M. 1926. (675 Clifton Ave., Newark, New Jersey.)

## P

Pack, Oran L., Geol, Engr., 1926. (Rifle, Colorado.)
Page, Lawrence C., E. M. 1908. (1102 Magnolia Ave., Norfolk, Virginia.) Secy.-Treas., H. L. Page & Company, Inc., 121 Bank St., Norfold, Virginia.
Page, Walter Chatfield, E. M. 1915. (Grand Junction, Colorado.) Concentration Engineer, International Smelting Co., Tooele, Utah.
Palsgrove, Harry G., E. M. 1903. (4147 Stuart St., Denver, Colorado.)
Paredes, Evaristo, E. M. 1905. Deceased.
Parker, Ben Hutchinson, E. M. 1924. (508 East Ninth St., Oklahoma City, Oklahoma.) Geologist, Marland Oil Company of Colorado, 1020 Patterson Bldg., Denver, Colorado.
Parker, Charles Owen, E. M. 1923. (4709 West 29th Ave., Denver, Colorado.) Mgr., W. E. Burlingame, 1915 Lawrence St., Denver, Colorado.
Parker, James H., E. M. 1895. Box 52, El Paso, Texas.
Parker, Nathan Howard, E. M. 1916. Deceased.
Parker, Russell Johnston, E. M. 1919. (1915 Lawrence St., Denver, Colorado.) Forminiere Tshikapa, Kasai District, Congo, Belge, Africa.
Parkinson, Gerald Hoy, E. M. 1925. (6532 Greenwood Ave., Chicago, Illinois.)
Parkinson, Lute J., E. M. 1923. (6532 Greenwood Ave., Chicago, Ill.) Engr. Ste. Internationale Forestiere et Miniere de Congo, Tshikapa, Kasal District, Belge, Congo, Africa.
Parks, George Alexander, E. M. 1906. Governor of Alaska, Box 408, Anchorage, Alaska.
Parrish, Karl Calvin, E. M. 1901. Gen. Mgr., General Construction Company, Box 6, Barranquilla, Columbia, S. A.
Parsons, F. H., E. M. 1907. 611 E. 23rd St., Patterson, New Jersey.
Parsons, Horace Fleet, E. M. 1903. (1719 Fourth Ave., Scottsbluff, Nebraska.) Mgr. & Engr., raFmers Irrigation District, Scottsbluff, Nebraska.
Pasquella, George Graham, E. M. 1924. (519 East 18th Ave., Denver, Colorado.)
Patrick, William B., E. M. 1909.
Patterson, John Wilfred, E. Met. 1925. (2438 W. Ave. 30, Los Angeles, California.)
Patterson, S. B. Jr., E. M. 1906. Gen. Mgr., Calcite Quarry Company, Myerstown, Pennsylvania.
Paul, Russell B., E. M. 1902. (160 Front St., New York, N. Y.) Mgr., Mines, New Jersey Zinc Co., 160 Front St., New York City.
Paul, William H., E. M. 1896. Consulting Mining Engineer, 3415 Colfax Ave., "B", Denver, Colorado.
Peabody, William Alden, Chem. Engr. 1923. (1106 East 19th St., Cheyenne, Wyoming.) Asst. Dept. Biochemistry, University of Colorado Medical School, R*A-218, 4200 E. 9th Ave., Denver, Colorado.
Pearce, James W., E. M. 1914. (1506 East East 69th St., Chicago, Illinois.) Goodman Manufacturing Company, Halsted St., & 48th Place, Chicago, Illinois.
Peck, James Arthur, E. M. 1923. (423 North Tejon St., Colorado Springs, Colorado.) Asst. Treasurer, Portland Gold Mining Company, Independence Mill, Victor, Colorado.
Peck, Vernon McKinley, E. M. 1923. (150 Elmwood Ave., Bridgeport, Conn.) Ingersoll-Rand Company, 108 West 2nd St., Los Angeles, California.
Peet, Vincent Cooper, E. M. 1922. Consulting Petroleum Engineer, 514 Indiana St., South Pasadena, California.
Pellish, Maxwell Carleton, E. M. 1925. (2121 Gilpin St., Denver, Colorado.)
Pendery, John M., E. M. 1900. Deceased.
Peregrine, William D., E. M. 1913. (220 South Marion St., Denver, Colorado.) Box 76 Telluride, Colorado.
Peri, Alberto, E. M. 1921. (P. O. Box 35, Morococha, Peru.) Gen. Mgr., Yacumina Mines, Box 255, Lima, Peru, S. A.
Perkins, Alfred E., E. Met. 1910. Western Mgr., Colonial Steel Company, 308 Kearns Bldg., Salt Lake City, Utah.
Peterson, Axel Johannes, E. M. 1923. Draftsman, City Plan Commission, Detroit, City Hall, Detroit, Michigan.
Pfeiffer, G. N., E. M. 1905. Pfeiffer & Sauter, Consulting Engineers, 121 South 17th St., Herrin, Illinois.
Phelps, Harlow D., E. M. 1910. Mining Engineer, P. O. Box 707, Prescott, Arizona.
Phelps, W. B., E. M. 1907. 606 Security Bldg., Pasadena, California.
Pierce, Albert LeRoy, E. M. 1922. (1515 Spruce St., Boulder, Colorado.) Millman, Amador Metals Reduction Company, Box 478, Jackson, California.
Pilger, Newton Waldemare, E. M. 1906. (Route 7, Box 382, Los Angeles, California.)
Pittman, Frank L., E. M. 1914. R. F. D. No. 3, Puyallup, Washington.
Place, J. Sterling, E. M. 1913. (57 Hawthorne Ave., East Orange, New Jersey,) Orvington Smelting & Refining Co., Irvington, N. J.
Platt, Edwin H., E. M. 1900. Plant Mgr., Chipman Chemical Company, Inc., Martinez, California.
Posso, Vasquez Carlos, E. M. 1926. (Celi El Valle, Colombia, S. A.)
Post, George M., E. M. 1894. Supt. Construction, U. S. Indian Irrigation Service, 609 North 6th St., Albuquerque, New Mexico.
Poulin, John Anthony Howard, E. M. 1921.
Powell, George F., B. S. 1897. (1648, Nogales, Arizona.) Mgr., El Tajo Mining Company, Poza, Sonora, Mexico.
Powell, Ralph Sterling, E. M. 1921. (5020 Junius St., Dallas, Texis.) Texas Company, Wichita Falls, Texas.
Powers, Kenneth Wilson, E. M. 1925. (7 Jefferson Ave., Binghamton, New York.) Ingersoll-Rand Company, Denver, Colorado.
Powers, Oliver, E. M. 1902. Contracting, San Francisco Mines of Mexico, Ltd., Apt.

165, Parral, Chih., Mexico.
Poy, Clarence William J., E. M. 1924. (365 East 12th St., Portland, Oregon.) Engr. Dept. Kennecott Copper Corporation, P. O. Box 217, Latouche, Alaska.
Pratley, Henry Hart, E. M. 1922. (Beta House, Golden, Colorado.) Foreman, Chief Consolidated Mining Co., Eureka, Utah.
Pray, Milton A., E. M. 1908. Fernley, Nevada.
Pray, Winfred A., E. M. 1901. Farmer & Stock Grower, Fernley, Nevada.
Prentiss, Louis Watkins, E. M. 1921. Lt. F. A. c|o Agartant General, U. S. A., Washington, D. C.
Pressler, L. P., E. M. 1905. Chief Engr., St. Joseph Lead Company, River Mines, Missouri.
Price, Bailey English, E. M. 1923. (1523 South Second, Louisville, Kentucky.)
Price, Harold C., E. M. 1913. Owner & Manager, Welding Engineering Company, Box 432, Bartlesville, Oklahoma.
Price, Lyttleton Jr., E. M. 1900. 322 Detwiler Bldg., Los Angeles, California. Oil & Mining in Mexico.
Prier, Truman Delmar, E. M. 1904.
Prior, Charles E. Jr., E. M. 1913. c|o Mexican Corporation, Fresnillo, Zacetecas, Mexico.
Prout, John, E. M. 1900. General Manager, ezas, Arizona.
Central Copper Co., of Arizona, Dos Cab-
Pullen, Lester L., E. M. 1910.
Purdy, Irvine A., E. Met. 1910. c|o Timber Butte Mining Co., Butte, Montana.
Putnam, George B., E. M. 1905. Deceased.

# Q

Quayle, Theodore W., E. Met. 1907. (844 S. Washington St., Denver, Colorado.) Phelps-Dodge Corp., Nacozari, Mexico.
Quiroga, Manuel Filomeno, E. M. 1924. Banamichi, Sonora, Mexico.

# R

Rabb, E. M., E. M. 1905. Deceased.
Ralph, Walter Herbert, E. M. 1917. (General Delivery, Tyrone, New Mexico.)
Rambo, William C. J., E. M. 1909. Rambo & Regar, Inc., 1515 Powell Street, Norristown, Pennsylvania.
Ramlow, William G., E. M. 1912. (729 Dayton Ave., St. Paul, Minn.) Civil Engr., City of St. Paul, 25 East 5th St., St., Paul, Minnesota.
Ramsey, Elmer, R., E. M. 1912. (2385 Albion St., Denver, Colorado.) Western Sales Mgr., The Door Company, Cooper Bldg., Denver, Colorado.
Rankin, Dudley LaMar, P. E. 1923. (146 South Washington St., Casper, Wyoming.) Standard Oil Company of Indiana, Engr. Dept., Plant No. 3, Casper, Wyoming.
Ranson, Rastus S., E. M. 1913. Deceased.
Rath, C. M., E. M. 1905. (1254 Cook St., Denver, Colorado.) Geologist, Midwest Refining Company, Box 240, Denver, Colorado.
Ray, Donald Mar, E. M. 1925. Bookkeeper, J. E. Adamson, 17th & Larimer Sts., Denver, Colorado.
Raymond, Howard Monroe, Hon., S. D. 1922. President, Armour Institute of Techology, Chicago, Illinois.
Reddin, John Joseph, E. M. 1924. (2909 West 29th Ave., Denver, Colorado.) Junior Engr., Public Service Company of Colorado.) Gas & Electric Bldg., Denver, Colorado.
Reed, Charles Emory, C. E. 1924. (828 Park St., Trinidad, Colorado.)
Reed, Ethbert Frank, E. M. 1922. (828 Park St., Trinidad, Colorado.) Asst. Engr., American Smelting & Refining Co., Santa Barbara, Chih., Mexico.
Reinhard, Frank J., E. M. 1905. (816 10th St., Golden, Colorado.) 438 Equitable Bldg., Denver, Colorado.
Reith, Lindley M., E. M. 1918. (Woodland, California.) Supt., Sonora Plant, Pacific Lime and Plaster Company, Sonora, Toulume County, California.
Renken, Howard C., Chem., Engr., 1925. (4565 Bryant St., Denver, Colorado.)
Reno, Charles F. A., E. M. 1908.
Reno, Horace T., E. M. 1902. (2415 Hayward Place, Denver, Colorado.) Resident Engr., Colorado Highway Department, Sapinero, Colorado.
Reubendale, Joseph Myron, E. M. 1924. (Manitou, Colorado.) 2564 Midlothean Blvd., Youngstown, Ohio.
Reynolds, Karl William, E. M. 1920. (1747 Williams St., Denver, Colorado.)
Rhodes, Louis Clifford, E. M. 1922. (4300 Ga. St., Gary, Indiana.) 120 Howard St., Hibbing, Minn.
Rhodes, William B., E. M. 1903. Surface Dept., Cia Dos Estrellas Minera "Las Dos Estrellas," Dos Estrellas, Michocan, Mexico.
Rich, Joseph U. G., E. M. 1908. Factory Supt., American Syrup and Preserving Company, 5525 Clemmenes Ave., St. Louis, Missouri.
Richards, Alfred F., E. M. 1922 (as of class of 1908.) 3419 North Ferdinand St., Tacoma, Washington.) Supt., Alaska Endicott, M. & M. Co., Wm. Henry Bay, Alaska.
Richards, Edwin R., E. M. 1905. Cia Minera de Penoles, S. A., Apartado 251, Monterey, N. L., Mexico.
Richards, John V., E. M. 1902. Mining Engineer, 355 North Ridgewood Place, Los Angeles, California.
Richardson, Allan S., E. M. 1912. (1238 West Granite St., Butte, Montana.) Chief Ventilation Engr., Anaconda Copper Mining Company, Butte, Montana.
Richardson, Carleton, E. M. 1923. Deceased.
Riddle, Donald D., E. M. 1918. (425 Bulkley Bldg., Cleveland, Ohio.) Mining & Petroleum Engr., C. F. Powell & Associates. 141 Broadway, New York, N. Y.
Riggs, George Dewey, E. M. 1926. (132 So. 5th St., Klamath Falls, Oregon.)
Riley, John Alan, E. M. 1923. (Cr. F. H. Riley, Crane Company, Bridgeport, Conn.) Mine Engr., Bethlehem Chile Iron Mines Co., Mina Tofo, La Higuera, Coquimbo, Chile.
Ripley, George Clinton, E. M. 1906. Deceased.
Rising, Arthur F., E. M. 1899. Deceased.
Ristedt, Ernest J., E. Met. 1909. Cia de Santa Gertrudis, S. A. Apartado 1, Pachuca, Hidalgo, Mexico.
Ritter, Glenn L., P. E. 1924. (2724 Channing Way, Berkeley, California.) Research Chemist, Standard Oil Company, Richmond, California.
Roberts, Henry M., E. M. 1912. (1471 High St., Denver, Colorado.) Secy., The J. Fred Roberts & Sons Construction Co., 206 Tramway Bldg., Denver, Colorado.
Roberts, Keith, E. M. 1915. (1014 Lake Ave., Wilmette, Illinois.) Mining Engr., Suite 203, Reaper Block, Chicago, Illinois.
Roberton, Fitch, E. M. 1920. (5601 North 45th St., Tacoma, Washington.) American Smelting & Refining Company Smelter, Tacoma, Washington.
Robertson, John Jr., E. M. 1922. (401 West 11th St., Pueblo, Colorado.) Real Estate and Insurance, 106 West 3rd St., Pueblo, Colorado.
Robey, Lloyd, E. M. 1900. c|o Colorado Mining Company, Aroray, Masbate, P. I.
Robineau, Maurice Henry, E. M. 1923. (204 Robineau Road, Syracuse, New York.) Owner, Western Nebraska Oil Company, Sidney, Nebraska.
Robinson, Edward Wesley, E. M. 1920. (7337 Coles Ave., Chicago, Illinois.) Asst. Chief Engr., Continental Casualty Co., 910 Michigan Ave., Chicago, Illinois.
Robinson, George Philip, E. M. 1904. (1040 Josephine St., Denver, Colorado.) Supt., Aguascalientes Smelter, American Smelting & Refining Company, Apartado 137, Aguascalientes, Ags., Mexico.
Rockwood, Carl A., E. M. 1912. (1104 Iowa Ave., Butte, Montana.) Engr. Dept., Elm Orlu Mining Company, Butte, Montana.
Rodriquez, J. C., E. M. 1898. Banker, Saltillo, Coah., Mexico.
Rodriquez, Juan Alejandro, E. M. 1921. Casilla 242, Oruro, Bolivia.
Rogatz, Henry, E. M. 1926. (302 Fifth Ave., New York City, New York.)
Rogers, Charles Arthur, E. M. 1915. Paymaster, Hitchcock & Tinkler, Inc., East Portal, Moffat Tunnel, Colorado.
Rolands, Hugo, E. M. 1923. (c|o Mrs. Minnie Rolands, Salisbury, N. Y.)
Roll, George H., E. M. 1919. (Philips Manor, Tarrytown, New York.) Asst. Secy. & Treas., Bakelite Corporation, 247 Park Ave., New York, N. Y.
Roller, Arthur H., B. S. 1897. (550 Filmore St., Denver, Colorado.) Consulting Engineer, 926 Equitable Bldg., Denver, Colorado.
Rollin, George William, E. M. 1924. (307 East 169th St., New York, N. Y.) Draftsman & Designer, Lion Oil & Refining Co., Eldorado, Arkansas.
Rolston, Clifford O., E. M. 1926. (Wilmington, Ohio.)
Romine, Thomas B., E. M. 1919. (538 Lincoln St., Walla Walla, Washington.) Coleman, Texas.
Root, Charles D., E. M. 1908.
Rosette, Breese, E. M. 1915. (109 North Cordova St., Alhambra, California.) Ingersoll-Rand Company, c|o Holly Mason Hardwall Co., Spokane, Wash.
Ross, George M., E. Met. 1907. Deceased.
Ross, Sidney Edward, E. M. 1925. (2709 South Grand St., Los Angeles, California.)
Rowe, Charles Elmer, E. M. 1902. (1711 Rio Grande St., Austin, Texas.) Associate Professor of Drawing, University of Texas, University of Texas, Austin, Texas.
Rowe, Edward E., B. S. 1895. Deceased.
Royer, Frank W., E. M. 1899. 1212 Hochingsworth Bldg., Los Angeles, California.
Rudd, Arthur H., E. M. 1900. (1510 Ford St., Golden, Colorado.)
Rusman, Benjamin A., E. M. 1913. 1272 Washington St., Denver, Colorado.
Russell, Donald O., E. M. 1909. No. 8 Old Palace Lane, Richmond, Surrey, England.
Ryan, Christopher Winfree, E. M. 1923. Engineer, Standard Soapstone Corp., Phoenix, Arrington, Va.
Ryan, Joseph Alinua, E. M. 1923. United Verde Copper Co., Box 1604, Jerome, Arizona.
Ryan, W. E., E. M. 1905. Shirley-Savoy Hotel, Denver, Colorado.

# S

Sackett, Blaire L., E. M. 1909. (Cr. Clarence Sackett, 828 Broad St., Newark, N. J.) Asst. Supt., International Smelting Company, Tooele, Utah.
Saint-Ditzier, Julius L., E. M. 1894. Deceased.
Sale, Andrew Jackson, E. M. 1901. Consolidated Copper Mines Co., Kimberly, Nevada.
Salnekov, Ivan Stevens, P. E. 1925. Engineer, Carter Oil Co., Burbank, Oklahoma.
Salsbury, Melford H., E. M. 1926. (915 So. Downing St., Denver, Colorado.)
Salzer, George, E. M. 1921, Sc. D. 1922. (1050 Sherman St., Denver, Colorado.) Asst. Prof. Descriptive Geometry, Colorado School of Mines, Golden, Colorado.
Sandusky, Samuel Craig, E. M., E. Met. 1908. 222 F. St., Salida, Colorado.
Savage, Eros Marshall, E. M. 1922. Research Engineer, Shell Oil Company, Signal Hill Los Angeles, California.
Saxton, Frank B., E. M. E. Met. 1912. (101 West Street, Cripple Creek, Colorado.) Supt. Mary McKinney Mine, Box 1546, Cripple Creek, Colorado.
Schade, Roger M., E. M. 1921.
Schaffer, Louis, E. M. 1909. Deceased.
Scheble, Max Carl, E. M. 1901. (P. O. Box 1104, San Antonio, Texas.) Vice-Pres., Krueger Machinery Company, San Antonio, Texas.
Schellenberg, Gustave W., E. M. 1912. 4235 Wood St., Wheeling, W. Va.
Scherrer, Leo Anthony, E. M. 1924. (2127 Greenwood St., Pueblo, Colorado.) G. E. Dalton Company, 747 Warehouse St., Los Angeles, California.
Schlereth, C. Quinby, E .M. 1906. (911 Mariposa St., Denver, Colorado.) Consulting Mining Engr., Whitaker & Schlereth, 25 Broad St., New York, N. Y.
Schneider, August W., E. M. 1911. (309 South Newell St., Coalgate, Oklahoma.) Supt. Keystone Coal & Mining Company, Coalgate, Oklahoma.
Schneider, Charles Mathews, E. M. 1920. (12 Gladstone Apts., Colorado Springs, Colorado.)
Schneider, George William, E. M. 1921. (1853 West Colfax Ave., Denver, Colorado.) Geologist, Arkansas Fuel Oil Company, Dallas, Texas.
Schneider, George W., E. M. 1894. Manager Bolivia Gold Explor. Company, Sorata, Bolivia, S. A.
Schneider, Henry G., E. M. 1918. (Box 857, Shreveport, Louisiana.) Division Geologist, Amerada Petroleum Corporation, 930 Giddens-Lane Bldg., Shreveport, La.
Schoder, William Paul, E. M. 1922. (913 Corona St., Denver, Colorado.) Smuggler-Union Mining Company, Box 465, Telluride, Colorado.
Schumann, Enrique A., E. M. 1897.
Schwab, Philip Alexander, Geol. Engr. 1924. (Dawson Springs, Kentucky, Box 146.)
Scott, Wilfred Welday, D. S., 1923. Professor Chemistry, University Southern California, Los Angeles, California.
Sealey, Fred C., E. M. 1917. Drawer F., Houston, Texas.
Sears, Norman E., E. M. 1924. (East Dennis, Mass.) Exp. Engr., Giant Powder Company Cons., 1111 Continental Bank Bldg., Salt Lake City, Utah.
Seeman, Arthur Klein, E. M. 1922. (379 Washington Ave., Brooklyn, New York.) Thriftway Laundry, 984 E. 35th St., Brooklyn, N. Y.
Selvidge, John Vivian, E. M. 1923. (1116 East 9th St., Kansas City, Mo.)
Serrano, Juan Enrique, E. M. 1920. (Av. Condell 3, Santiago, Chile.) Gen. Mgr., Cia Minera Maria Francisco, De Huanuni,

Huanuni, Bolivia, S. A.
Serviss, Frederick Leverne, E. M. 1920, M. S. 1922. (1352 Kearney St., N. E., Washington, D. C.) Instructor in Geology and Mineralogy, Catholic University of America, Washington, D. C.
Shanley, J. R. Jr., E. M. 1915.
Shaver, F. J., E. M. 1907. (3533 East 2nd St., Long Beach, California.) Petroleum Engr., Shell Company of California, Long Beach, California.
Shaw, Laroy Adelbert, P. E. 1925. (4749 40th St., San Diego, California.
Shaw, Merle Ney, E. M. 1925. (Forrest, Illinois.)
Shaw, Ralph H., E. M. 1911. (1434 East 9th South St., Salt Lake City, Utah.) Mining Engineer, Silver City, Utah.
Sheahan, John Alonzo, P. E. 1926. (43 Seminole Ave., Atlanta, Georgia.)
Shen, Mung-Chin, E. M. 1922.
Shepherd, Glenn L., P. E. 1926. (4728 Josephine St., Denver, Colorado.)
Sheriger, Paul Maxwell, E. M. 1923. (Staatsburg, New York.) Junior Mining Engr., Braden Copper Company, Rancaguar, Chile, S. A.
Sherman, Scott Holcomb, E. M. 1904. Supt. National Metallurgical Company, Charcas, S. L. P., Mexico.
Shetler, Waverly, E. M. 1895. Deceased.
Shirck, Elmer D., E. Met. 1924. (3650 Powers Way, Youngstown, Ohio.)
Short, Harlan Eslie, E. M. 1924. (Hazelton, Iowa.) Asst. Prof. Physics, Colorado School of Mines, Golden, Colorado.
Showman, Harry M., E. M. 1910. (912 Hyperion Ave., Los Angeles, California.) Asst. Prof. Mathematics, University of California, Southern Branch, Los Angeles, California.
Shue, George Llewellyn, Chem. Engr., 1926. (1416 Delaware St., Denver, Colorado.) Fellow, Colorado School of Mines, Golden, Colorado.
Sill, Rush Tabor, E. M. 1906. Sill & Sill, Mining & Metallurgical Engineers, 1011 South Figueroa St., Los Angeles, California.
Silver, Leopold, E. Met. 1910. Deceased.
Simmons, Paul C., E. M. 1922. (Belen, New Mexico.) Division Engr., of Mine Surveying, San Diego Cuantla, Morelos, Mexico.
Simon, William Wayne, E. M. 1915. (Florence, Colorado.) Mountain Home, Idaho.
Simpson, William P., E. M. 1901. (1744 Broadway, Denver, Colorado.) Root & Simpson, Assayers & Metallurgical Chemists, P. O. Box 2069, Denver, Colorado.
Sisson, Myron LeRoy, E. M. 1920. (1023 Twelfth St., Golden, Colorado.) Engr., Hayden Bros. Coal Corp., Haybro, Colorado.
Sistermans, Frank W., E. M. 1923. Apt. So, Velardena, Durango, Mexico.
Skavlem, Henry G., E. M. 1910. (Prospect Ave., Janesville, Wisconsin.) Supt. McIntyre Mines, Shumacher, Ontario, Canada.
Skinner, Henry Clay Taylor, Geol. Engr., 1924. (106 Park Ave., East, Princeton, Illinois.) Asst. Supt. Highways. American House Block, Princeton, Illinois.
Skinner, Lewis B., B. S. 1895. (1070 Humboldt St., Denver, Colorado.)
Slater, Amos, E. M. 1900. Consulting Mining Engineer, 219 Pioneer Bldg., Seattle, Washington.
Slaughter, Thomas Nolan, E. Met. 1923. (413 N. Ninth St., Cleburne, Texas.) Flotation Operator, Park City Mining & Smelting Co., Box 74, Park City, Utah.
Sloan, W. Arthur, E. M. 1903. (512 N. Louise St., Glendale, California.) Chemist U. S. Bureau of Mines, Bin H., University Station, Tuscon, Arizona.
Small, Harvey B., E. M. 1901. Deceased.
Small, Sidney S., E. M. 1917. General Contracting, 914 Marsh-Strong Bldg., Los Angeles, California.
Smirnoff, Michael Alexander, E. M. 1924. (Pokrowka, 40.3, Moscow, Russia) Asst. Geologist Roxanna Petroleum Corp., 1st National Bank Bldg., Houston, Texas.
Smith, Albert W., E. M. 1914. Supt. Steel Plant, Youngstown Sheet & Tube Company, Youngstown, Ohio.
Smith, G. Dupree, M. E. 1891. 135 South 23rd St., San Jose, California.
Smith, Claude Henry, E. M. 1900. Deceased.
Smith, E. M., E. M. 1905. (9612 52nd Ave., South, Seattle, Washington.) Head Draftsman, Link Belt Company, Seattle, Wash.
Smith, Frank T. Augustus, E. M. 1916. Hamilton, Nevada.
Smith, Gerald Wood, E. M. 1924. (4212 Douglas St., Omaha, Nebraska.)
Smith, Gilbert Havens, Chem. Engr. 1924. (1135 York St., Denver, Colorado.)
Smith, Harry C., E. M. 1898. Deceased.
Smith, Howard C., E. M. 1913. Engineer, Cia de Santa Gertrudis, Pachuca, Hgo., Mexico.
Smith, Lamont E., P. E. 1924. (135 Humboldt St., Denver, Colorado.) Petroleum Engineer, Urbain Corp., Box 75, Midwest, Wyoming.
Smith, Ralph W., E. M. 1914. (1845 Grant Ave., Denver, Colorado.) Ste. Genevieve, Missouri.
Smith, Roy F., E. M. 1911. Deceased.
Smith, Thomas G., E. M. 1899. R. R. 2, Grand Junction, Colorado.
Smith, Vernon Bonnyfield, E. M. 1923. 276 Grand St., Morgantown, W. Virginia.
Snedaker, Eugene G., E. M. 1914. University Club, San Francisco, California.
Snow, Robert E., E. Met. 1911. Cia Compania Minera de Cori, Acoponeta, Nuyarit, Mexico.
Solomon, Irwin R., E. M. 1913.
Sopris, Robert Freeman, Geol. Engr. 1926. (Box 34 San Juan, Porto, Rico.)
Soupcoff, Samuel M., E. M. 1910. Mining Engr., American Smelting & Refining Company, Salt Lake City, Utah.
Spangler, Howard, E. M. 1905. (834 West 116th St., Los Angeles, California.) Field Engr., Southern California Edison Co., Edison Bldg., Los Angeles, California.
Spencer, Walter Irving, E. M. 1904.
Spring, Archer T., E. M. 1912. Geologist, Box 566, Fort Collins, Colorado.
Sproul, Archibald O., E. M. 1926. (Tottenville, New York.) C. F. & I. Co., Pueblo, Colorado.
Squire, Latham Chaffee, E. M. 1922. (1401 Greenwood Ave., Pueblo, Colorado.)
Stanford, Joel Gibson, E. M. 1925. (Newman, Georgia.) 647 Boone Ave., St. Petersburg, Florida.
Stannard, Burt C., B. S. 1895. (2364 Woolsey St., Berkeley, California.) Supt., American Smelting & Refining Company, Selby, California.
Starbird, Edwin P., E. M. 1901. (3233 Polk St., Chicago, Illinois.)
Starbird, H. B., E. M. 1897. 2646 Magnolia Ave., Los Angeles, California.
Starr, Frank J., E. M. 1922. 6028 Maple Ave., St. Louis, Missouri.
Steele, James Henry, E. M. 1900. (1041 Lafayette St., Denver, Colorado.) Asst. Prin. Manual Training High School, Denver, Colorado
Stein, Edmund, E. M. 1913. Brucetown, Pennsylvania.
Steinhauer, Fred C., E. M. 1899. (650 Williams St., Denver, Colorado.) Supt. Crown Hill Cemetery and Engineer for George W. Olinger, Inc., 1429 Champa St., Denver, Colorado.
Stephano, Constantine Stephan, E. M. 1925. (1014-16 Walnut St., Philadelphia, Pennsylvania.) Graduate Student, Mass. Inst. of Tech., Boston, Mass.
Stephens, Charles N., E. M. 1898. The Nagnarox Co., Oakland, California.
Stephens, Frank M., E. M. 1913. (777 South Williams St., Denver, Colorado.) Supt. Pacific Mines Corporation, Ludlow, California, (Stagg, P. O.)
Stephens, Wallace A., B. S. 1893. Deceased.
Stephenson, Tiffany Eugene, E. M. 1906.
Stevens, Harry F., P. E. 1923. (Breckenridge, Michigan.) Henry L. Doherty & Co., 60 Wall Street, New York, N. Y.
Stevenson, Philip Hooper, E. M. 1923 (2712 Glenmore Ave., South Hills P. O., Pittsburgh, Pa.) Colorado Fuel & Iron Co., Pueblo, Colorado.
Stewart, Charles Henry, E. M. 1925. (Waco, Nebraska.) Cisco, Texas.
Stewart, High A., E. M. 1912. (1415 Milwaukee St., Denver, Colorado.) Geologist, Texas Production Company, Box 2100. Denver, Colorado.
Stewart, Lincoln Adair, E. M. 1915. (111 West 10th St., Hutchinson, Kansas.) Supt. Stargo Mines, Inc., Morenci, Arizona.
Stockton, Robert S., E. M. 1895. Supt., Operator & Maintenance, Western Section, Irrigation Block, Canadian Pacific Railway, Dept. of Natural Resources, Strathmore, Alberta, Canada.
Stoeckley, E. F., E. M. 1905.
Storm, Lynn W., E. M. 1902. Sun Oil Company, Geologist, Trinity, Texas.
Storms, Frank Howard, E. M. 1924. (11 Broadway, New York.) Sales Engr., Ingersoll-Rand Company, Box 3809, Tampa, Florida.
Stortz, Frank Joseph, E. M. 1923. Mining Engineer Coal River Colleries, Seth, West Virginia.
Stotesbury, H. W., E. M. 1907. Victor, Colorado.
**Stott, Charles Edwin, E. M. 1925.** c/o The Moctezuma Copper Company, Pilares de Nacozari, Sonora, Mexico.
Street, Gerald B., E. M. 1901. Asst. Director Service Dept., E. I. DuPont de Nemours & Company, 7030 DuPont Bldg., Wilmington, Delaware.
Strock, Hale McCosh, E. M. 1922.
Strohl, George F., E. Met. 1910. Deceased.
Stronck, Herbert N., E. M. 1913. (6248 Wayne Ave., Chicago, Illinois.) Consulting Engr., 1814 Harris Trust Bldg., Chicago, Illinois.
Strong, Earle A., E. M. 1914. Private and Consulting Practice, Metallurgical Engr., 624 Ogden St., Denver, Colo.
Strout, Fred McL., E. M. 1896.
Stuart, Malcolm M., E. M. 1908. Deceased.
Stubbs, John Tucker, Geol. Engr., 1926. (2300 Birch St., Denver, Colorado.)
Suhr, Otto B., E. M. 1895. (Deep Springs, Inyo, County, California.) Director. Trustees of Deep Springs, Deep Springs, California.
Sun, Yen-Chung, E. M. 9122, Fung Chist, Kwel Teh, Honan, China.
Surfluh, John Samson, E. M. 1921. (3330 Manitou Ave., Los Angeles, California.) Manufacturer Cement Blocks, 3354 E. Colorado St., Pasadena, California.
Swainson, Otis W., E. M. 1910.
Swanson, C. Arthur, E. M. 1913. Principal, Globe High School, Box 1597, Globe, Arizona.
Swart, Walter Goodwin, Hon. E. M. 1917. Vice-Pres., & Gen. Mgr., Mesabi Iron Company, Babbitt, Minnesota.
Sweet, Arthur N. (Zwetow), E. M. 1911. (Box 282, Leadville, Colorado.) Supt. Leadville Deep Mines Co., Leadville, Colorado.
Schooley, Floyd LeRoy, E. M. 1925. (Arvada, Colorado.)
Swift, Arthur Dean, E. M. 1923. (Hoquiam, Washington.)

# T

Taggart, George K., E. M. 1903. Corzelius Bros. & Taggart, Drilling Contractors, Eastland, Texas.
Taggart, Oliver R., E. M. 1909. Chief Chemist. St. Louis Smelting & Refining Co., Collinsville, Illinois.
Tanner, Horace Ager, E. M. 1921.
Taylor, George Keith, E. M. 1925. (2106 Barton Ave., Richmond, Virginia.) Bethlehem Mines Corporation, Ellsworth, Pennsylvania.
Taylor, Harry Picotte, E. M. 1900.
Taylor, Lemuel K., E. M. 1914.
Taylor, Leslie Samuel, E. M. 1926. (2628 Court Place, Pueblo, Colorado.)
Teale, Frederick Layton, E. M. 1925. (824 S. Union Ave., Pueblo, Colorado.) Combustion Fuel & Iron Co., Pueblo, Colorado.
Teddlie, John Frederick, Jr., E. M. 1923. (1116 South Lake St., Fort Worth, Texas.)
Teets, John Nicholas, E. M. 1915. (Box 595, Santa Monica, California.) Partner, The Wilkinson Company, Box 303, Santa Monica, California.
Terrill, A. C., E. M. 1905. (342 West Lexington Drive, Glendale, California.) P. E. State Mining Bureau, Los Angeles, California.
Tescher, Samuel, E. M. 1904. (2558 Cherry St., Denver, Colorado.)
Thomas, George Dewey, E. M. 1921. 912 Giddens-Lane Bldg., Shrevejort, La.
Thomas, George Willard, Chem. Engr. 1926. (408 E. 25th St., Cheyenne, Wyoming.) Fellow, Colorado School of Mines, Golden, Colorado.
Thomas, John Sargent, E. M. 1904. Deceased.
Thomas, Lester C., E. M. 1904. (761 Detroit St., Denver, Colorado.) Pres. The Thomas Motor Company, 1917 Broadway, Denver, Colorado.
Thompson, James S., E. M. 1899. Deceased.
Thomson, A. T., E. M. 1905. Phelps-Dodge Corp. 99 John St., New York, N. Y.
Thomson, Francis Andrew, E. M. 1904. Director, Idaho Bureau of Mines and Geology, Dean, School of Mines, University of Idaho, Moscow, Idaho.
Thomson, Waldemar Peter, E. M. 1921. Construction Supt., Barkelew & Gould, Builders Exchange, Los Angeles, California.
Thum, Ernest E., E. M. 1906. (34 Aubrey Road, Montclair, New Jersey.) Mgr. Publicity Dept., Union Carbide & Carbon Co. 30 East 42nd St., New York, N. Y.
Thurstin, Robert A., E. M. 1917. (1838 Hastings Ave., East Cleveland, Ohio.) Supt., Francisco Mine, Minas de Matahambre, Matahambre, Prov., Pinar del Rio, Cuba.
Thurston, Ralph V., E. Met. 1911. Payette, Idaho.
Tiffany, Emory Mayers, E. M. 1924. 1966 Hollywood Ave., Salt Lake City, Utah.
Tippett, J. M., Hon. E. M. 1924. Portland Gold Mining Company, Victor, Colorado.
Titsworth, Frederick S., E. M. 1895. (8 E. Ninth St., New York, N. Y.) Attorney

at Law, 36 West 44th St., Bar Bldg., New York, N. Y.
Toenges, Albert L., E. M. 1912. (710 North 21st St., Fort Smith, Arkansas.) Supt. Arkansas District, Western Coal & Mining Co., Fort Smith, Arkansas.
Tongue, Walter Barnard Jr., E. M. 1920. 31 Randolph Ave., Poughkeepsie, N. Y.
Townsend, Arthur R., E. M. 1899. 145 East 56th St., New York, N. Y.
Townsend, Charles Albert, E. M .1921. Deceased.
Traver, Will Merton Jr., E. M. 1916. (634 S. Williams St., Denver, Colorado.) Package Delivery, Service Inc., 1455 Fox St., Denver, Colorado.
Travis, Raymond Gordon, E. M. 1925. (Stillwell, La Porte County, Indiana.) La Vuelta: Intendencia del Choco Andagoya, via Buena Ventura, Columbia, S. A.
Trott, Maynard J., E. Met. 1908. 126 Courtland Ave., Topeka, Kansas.
Trott, Roland Stimson, E. M. 1906. (919 South Corona St., Denver, Colorado.)
Troubchaninoff, D. S., P. E. 1924. (Room 807 347 Madison Ave., New York, N. Y.) Chief Engr., Sonora Pulp & Timber Co., Ltd., Sonora, Nova Scotia, Canada.
Trueheart, Lawrence G., E. M. 1913. (736 E. Gunther St., San Antonio, Texas.) Casilla 47, Tupiza, Bolivia, S. A.
Trumbull, Loyal Wingate, E. M. 1904. (1835 Gaylord St., Denver, Colorado.)
Tsia, Hsiang, E. M. 1915. Chief Engr., Yueh Sheng Coal Mining Co., Ltd., Takunlun, Shantung, China.
Tsen, Bei-Chang, E. M. 1919. U. Y. Yen, Liyoung, Hunon, China.
Tsui, Yui-Kien, E. M. 1914.
Turner, Albert Maitland, E. M. 1921. (La Veta, Colorado.) Chemist, United States Gypsum Company, Sweetwater, Texas.
Turner, John H., E. M. 1914. 1004 Twelfth St., Golden, Colorado.
Tyler, Frederick Lyman, E. M. 1923. (1135 W. Platinum St., Butte, Montana.)
Tyler, Sydney B., E. M. 1899. Gen. Supt., The Tungsten Products Co., Bishop, California.

# U

Urteaga, Santiago, E. M. 1920. Candela, Coah., Mexico.
Utley, Howard Harris, E. M. 1900. River Smelting & Refining Company, Florence, Colorado.

# V

Vacek, Vincent F., E. M. 1910. Deceased
Valdez, Don C., E. M. 1922. (932 F. Street, Salida, Colorado.) Compania Minera de Penoles, S. A., Apartado 93, Torreon, Coah., Mexico.
Valentine, Malvern R., E. M. 1898. Deceased.
Van Burgh, Lisle R., E. M. 1917. (1095 Jackson St., Denver, Colorado.) Valuation Engr., Oil & Gas Section, U. S. Treas. Dept., Denver, Colorado.
Van Diest, Edmond C., E. M. 1886. Pres., Western Public Service Company, 412 Mining Exchange Bldg., Colorado Springs, Colorado.
Van Dolah, Parks Briggs, E. M. 1915. (P. O. Box 222, Puyallup, Washington.) Asst. Engr., C. M. & St. P. Ry., 515 W. Depot, Seattle, Washington.
Van Dorp, Glen Howe, E. M. 1915. (2016 Locust St., North Kansas City, Mo.) Treas. Standard Steel Works, North Kansas City, Missouri.
Van Gilder, Charles Pruden, E. M. 1922.
Van Wagenen, Hugh R., E. M. 1906. Mining Engr., 1035 Van Nuys Bldg., Los Angeles, California.
Vaughn, Robert Matthews, E. M. 1904. Deceased.
Voelzel, Gustave W., E. M. 1911. (2137 East Colfax Ave., Denver, Colorado.) Shift Boss, Ray Consolidated Copper Company. Ray, Arizona.
Volk, Russell H., E. M. 1926. (573 S. Spring St., Bucyrus, Ohio.)
Vorck, Charles Raben, E. M. 1916. (Cr. Wm. Lowe, 506 15th St., Golden, Colorado.) Petroleum Valuation Engineer, Oil & Gas Section, Income Tax Unit, Capitol Bldg., Denver, Colorado.
Wackenhut, George John, E. M. 1904. (430

# W

E. Colorado Avenue, Colorado Springs, Colorado.)
Wagner, Richard Edwin, E. M. 1926. (Kankakee, Illinois.)
Walker, Alexander D., E. M. 1912. Gen. Foreman, Stratton Leasing Co., Cripple Creek, Colorado.
Walker, Ronald Ogg, Geol. Engr. 1924. (818 Harrington Ave., Norfork, Virginia.) "El Aguila," Puerto Mexuo, Mexico.
Wallace, Howard J., E. M. 1904. (1643 Sierra Bonita, Hollywood, California.) Field Engineer, Forest Lawn Memorial Park, 1738 S. Glendale Ave., Glendale, California.
Wallace, Louis R., E. M. 1895. Rancho Santa Fe, California.
Walter, Adolph Schinner, E. M. 1915. (P. O. Box 385, Socorro, New Mexico.) Professor Mining & Metallurgy, New Mexico School of Mines, Socorro, New Mexico.
Waltman, William D., E. M. 1899. Urbain Corporation, 292 Madison Ave., New York, N. Y.
Wang, Shao-Ying, E. M. 1913. Professor of Mining, National University, Peking, China.
Ward, Merwin H., E. M. 1913. (314 East 12th St., Alton, Illinois.) Mgr., East Side Manufacturing Association, Granite City, Illinois.
Ward, William, F., E. M. 1903. (500 Washington St., Denver, Colorado.) Engr., Pacific Metals Corporation, Compania Minera Choco Pacifico, Andogoya, via Buenaventura, Columbia, S. A.
Warfel, C. G., E. M. 1907. Deceased.
Warnecke, Carl M., E. E. 1897. (914 Clark St., Sherman, California.) Asst. Supt., of Power, Pacific Electric Railway Co., 695 Pacific Electric Bldg., Los Angeles, California.
Warren, Seymour P., E. M. 1913. (914 Nineteenth St., Golden Colorado.) Associate Director, Experimental Plant, Colorado School of Mines, Golden, Colorado.
Washburn, Howard G., E. M. 1904. (Wallace, Idaho.) Asst. Gen. Mgr., Federal Mining & Smelting Co., Wallace, Idaho.
Washer, Phineas, P. E. 1926. (1515 Grant St., Denver, Colorado.
Wasley, William A., E. Met. 1909. Supt., El Favor Mine, La Querrada, Jalisco, Mexico.
Waterfield, Henry Wilson, E. M. 1925. 716 North 24th St., Richmond, Virginia.
van Vaterschoot van der Gracht, W. A. J M,. Hon. Sc. D. 1924. Cr. Marland Oil Company, Ponca City, Oklahoma.
Watrous, Mark U., E. M. 1914. Watrous & Tupton, Private Engineering Practice, Alamosa, Colorado. (Monte Vista, Colorado.)
Watson, Guy P., E. Met. 1910, E. M. 1912.
Farmer, R. D. 1, Box 83, Greeley, Colorado.
Watson, Hugh C., E. M. 1901. Deceased.
Watson, Samuel E., E. M. 1913. Anaconda Copper Mining Company, Box 1094, Anaconda, Montana.
Wattles, William C., E. M. 1903. (R. F. D. 1, Box 328, Glendale, California.) Civil & Title Engr., Title Insurance & Trust Company, Los Angeles, California.
Watts, Alfred C., E. M. 1902. (258 Douglas St., Salt Lake City, Utah.) Chief Engr. & Geologist, Utah Fuel Company, Calmut Fuel Company, 821 Judge Bldg., Salt Lake City, Utah.
Weaver, Gaylord C., (Kremmling, Colorado.) U. S. Gypsum Co., Southard, Oklahoma.
Weaver, Ralph M. Jr., E. M. 1920. Petroleum Geologist, Wynnewood, Oklahoma.
Weed, Floyd, E. M. 1897. Bailey Cobalt Mines, Ltd., Giroux Lake, Ontario, Canada.
Weil, Jacob, E. M. 1904. Deceased.
Weimar, William Donald, E. M. 1925. (814 Acoma St., Denver, Colorado.)
Weinig, Arthur J., E. Met. 1908. (509 14th St., Golden, Colorado.) Director, Experimental Plant, Colorado School of Mines, Golden, Colorado.
Weir, John A., E. M. 1909. (New Mexico School of Mines.) Socorro, New Mexico.
Weiss, Andrew, E. M. 1899. (1327 Fillmore St., Denver, Colorado.) Asst. Director of Reclamation Economics, U. S. Bureau of Reclamation, 1441 Welton St., Denver, Colorado.
Weise, Joseph J., E. Met. 1909.
Weller, John Maurice, E. M. 1926. (Pineville, Kentucky.)
Wells, Benjamin Taylor, E. M. 1904. 4 Av., Sur. No. 32, Guatemala, C. A.
Wells, Frank B., E. M. 1903. (1764 Atlantic Ave., Long Beach, California.)
Wertheim, Salomonson F. M. G. A., B. S. 1899. Deceased.
West, John R., E. M. 1910. Hercules Powder Co., Dover, N. J.
Wheeler, Charles E., E. M. 1894. Breckenridge, Colorado.
Wheeler, Robert M., E. M. 1908. (Mining Exchange Bldg., Denver, Colorado) Engr., Fredonia Mines Syndicate, Breckenridge, Colorado.
Whetsel, Raymond Victor, E. M. 1916. Apt. 285, Tampico, Tamps, Mexico.
Whitaker, Charles N. Jr., E. M. 1914.
Whitaker, Orvil R., E. M. 1898. (1819 Gaylord St., Denver, Colorado.) Whitaker & Schlereth, Consulting Engineers, 932 Equitable Bldg., Denver, Colorado.
White, J. L., E. M., E. Met. 1907. (1490 Stuart St., Denver, Colorado) Gen. Mine Supt., Southwest Metals Company, Humboldt, Arizona.
White, Leonard Lee, E. M. 1915. (Salida, Colorado.) Supt. New York, Honduras & Rosario Company, Sabana, Grande, Honduras, C. A.
White, Roger F., E. M. 1918. (805 North Benton May, Los Angeles, California.) Petroleum Valuation Engineer, 305 Bank of Italy Bldg., Los Angeles, California.
Whitehead, Paul, E. M. 1912. Ray Cons. Copper Co., Ray, Arizona.
Whitehouse, Howard D., E. M. 1908. Secy.-Treas., Continental & Commercial Securities Company, 208 South La Salle St., Chicago, Illinois.
Whitehurst, John Wesley, E. M. 1910. (401 West 18th St., Pueblo, Colorado.) Consulting Engr., 304. Western Securities Bldg., Denver, Colorado. 1330 Lowell, Butte, Montana.
Whitmor, Norman, E. M. 1926. (1660 Filbert Court, Denver, Colorado.
Wichmann, Lothar Emil, E. M. 1921. (Box 685, Telluride, Colorado.) Assayer, Compania Metallurgica Nacional, Matehuala, S. L. P., Mexico.
Wideman, Frank Lyme, E. M. 1923. (Arvada, Colorado.) Engr., Utah Apex Mining Company, Bingham Canyon, Utah.
Wiebelt, Frank Joseph, E. M. 1916. (Arvada, Colorado.) Gen. Mgr., Yellow Pine Mining Company, Goodsprings, Nevada.
Wigton, George H., E. M. 1913. (2090 South Ogden St., Denver, Colorado.) Metallurgical Supt., Chief Consolidated Mining Co., Eureka, Utah.
Wilcoxson, Edward D., E. M. 1912. 1314 Palm St., San Luis Obispo, California.
Wiley, Walter H., E. M. 1883. Mining Engineer, Palm Drive, Glendora, California.
Wilfley, Elmer R., E. M. 1914. (1793 Holly St., Denver, Colorado.) A. R. Wilfley & Sons, 615 Denham Bldg., Denver, Colorado.
Wilfley, George, E. M. 1913. (1300 High St., Denver, Colorado.)
Wilkinson, Mearle W., E. M. 1913, M. S. 1914. (942 20th St., Santa Monica, California.) Gen. Mgr., The Wilkinson Company, P. O. Box 305, Santa Monica, California.
Williams, Fred Tuttle, E. M. 1901. Deceased.
Williams, Irving B., E. Met. 1911.
Williams, John C., E. M. 1913. (Golden, Colorado.) Flotation Engr., Newport Chemical Works, Inc., Passaic, New Jersey.
Williams, Wakely A., E. M. 1899. Consulting Engineer & Operator, 946 Title Insurance Bldg., Los Angeles, California.
Wills, Neil H., Geol. Engr., 1926. (3027 N. 2nd St., Phoenix, Arizona.)
Wilson, Dudley M., E. M. 1909. Construction Engineer, Box 84, Brady, Texas.
Wilson, Harry Raymond, E. M. 1916. 511 Lafayette St., Denver, Colorado.
Wilson, John Human, E. M. 1923. Geologist, Pan American Oil Co., Apt. 94, Tampico, Mexico.
Withers, John Peter, E. M., 1923. (3010 McGee St., Kansas City, Mo.) Mining Engineer, Braden Copper Co., Raucagua, Chile, S. A.
Woeber, Lorenz Stapleton, E. M. 1922. (918 Lafayette St., Alameda, California.) Standard Oil Company of California, San Francisco, California.
Wolf, A. G., E. M. 1907. (1680 Steele St., Denver, Colorado.) Mining Engr., Texas Gulf Sulphur Company, Gulf, Texas.
Wolf, Harry J., E. M. 1903, M. S. 1913. (3 Glenwood Ave., Westmoreland, Little Neck, L .I.) Mining Engineer, 42 Broadway, New York, N. Y.
Wong, Albert, E. Met. 1923. Huang-mei Hsien, Hupeh, China.
Wong, William A., E. M. 1913. 526 School St., Honolulu, Hawaii.
Wong, Yoong Yih, E. M. 1920. Shanghai, China.
Woo, Yu Den, E. M. 1920. 960 Jaking Road, Shanghai, China.
Wood, Charlton Thomas, E. M. 1925. (Box 686, Williamson, West Virginia.)
Wood, Ernest B., E. M. 1909. (611 S. Williams St., Denver, Colorado.) Shanklan Ristine & Company, Engineers, 409 Boston Bldg., Denver, Colorado.
Wood, Flavius C. Jr., E. M. 1926. (1470 Logan St., Denver, Colorado.)
Woods, Rolland Henderson, E. M. 1924. (Box 106 Mission, Texas.)
Woods, Thomas H., E. M. 1897. (2112 Glenarm Place, Denver, Colorado.) Gen. Supt.

Camp Bird, Ltd., Drawer K, Ouray, Colorado.
Woolf, J. H. Jr., E. M. 1914. (1115 9th Ave., Greeley, Colorado.) I. Rothschild Producing Company, Greeley, Colorado.
Worden, John Charnock, E. M. 1923. (Y. M. C. A., Long Beach, California.) Transitman, Shell Oil Company of Southern California, Wilmington, California.
Worth, Lee K., E. M. 1917.
Wosk, Louis David, P. E. 1924. (4111 45th St., East San Diego, California.) Asst. Geologist, White Eagle Oil & Refining Co., Tulsa, Oklahoma.
Wraith, Charles R., E. Met. 1911. 1063 Seventh St., Anaconda, Montana.
Wright, Harold Haven, E. M. 1924. (P. O. Box 1156, Stanford University, California.) Engr. Marland Oil Company of California, P. O. Box 340, Wasco, California.
Wright, Thomas W., E. M. 1913. Deceased.
Wuensch, C. Erb, E. M. 1914. (30 S. Kingman Rd., South Orange, New Jersey.) c|o A. J. McAllister, 100 Broadway, New York, N. Y.
Wulff, John, E. M. 1924. (123 W. 183rd St., New York, N. Y.) Graduate Student, Yale University, 51 Prospect St., New Haven, Conn.
Wygle, Robert Howard, Geol. Engr. 1925. (R. F. D. 2, Keokuk, Iowa.) Miner, Phelps-Dodge Corporation, Box 792, Bisbee, Arizona.
Wyner, Alexander Seaman, E. M. 1925. (2312 High Street, Denver, Colorado.)

## Y

Yang, Wei T., E. M. 1914. Szecnuen, Bureau of Finance, Chengtu, China.
Yap, Chu-Phay, Chem. Engr. 1925. Research Asst. to Dr. Ancel St. John, Wappler Electric Company, Inc., 162-184 Harris Ave., Long Island, N. Y.
Yates, John Logan, E. M. 1923. Walnut Hill, Holmesburg, Pennsylvania.) Instructor of Mathematics, Washington University, St. Louis, Missouri.
Youker, C. Norman, E. M. 1912. Deceased.
Young, Frank B., E. M. 1895. Deceased.
Young, Louis Yoh-Ing, E. M. 1923.
Young, Peter A., E. M. 1913. Keenesburg, Colorado.
Yu, Wu Hen, E. M. 1922. Shin Chang, Chekiang, China.
Yuan, Pao-Chiang, E. M. 1917.

## Z

Zambrano, Jose, E. M. 1921. (90 Zaragosa St., Monterrey, N. L. Mexico.) Engr., Cia de Combustibles "Aguijita" S. A. Apartado 19, Aguijita, Coah., Mexico.
Zatterstrom, Theodore, E. M. 1923. Asst. Geologist, Texas Production Company, Box 2100, Denver, Colorado.
Zulch, Herman C., E. M. 1908. (3931 West 60th St., Los Angeles, California.)
Zulch, William G., E. M. 1914. Gen. Mgr., Gene Morriss One Day Auto Painting System, 274 I St., San Bernardino, California.
Zwetow, A. N. 1911 (see Sweet, A. N.)

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**Deep Springs**—Suhr, O. B.
**Delano**—Miller, E. D.
**Englemine**—Fominyh, M. P.
**Escondido**—McLeod, J. N.
**Fresno**—Goodwin, G. G.
**Fullerton**—Bastanchury, G. A.
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**Galeta**—Hamilton, W. J.
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**Grass Valley**—Hubbard, J. V.
Mann, J. R. C.
Nye, R.
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Brook, E. J.
Brown, F. A.
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Cunningham, S. D.
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Herron, J. C.
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Levy, M. M.
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Zatterstrom, T.

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Kiesel, A. H.

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Spring, A. T.

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Woolf, J. H. Jr.

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Sweet, A. N.

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Christy, H. H.
Merryman, H. E.

**Oak Creek**—Kessler, D. L.

**Ouray**—Woods, T. H.

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Ferguson, R. D.
Jenni, A. E.
Keating, W. H.
May, R. R.
Mayhugh, D. E.
Neugebauer, K. E.
Robertson, J.
Sproul, A. A.
Squire, L. C.
Stevenson, P. H.
Taylor, L. S.
Teale, F. L.

**Rico**—Krantz, P. R.

**Rifle**—Pack, O. L.

**Saguache**—Hammond, W. L.

**Salida**—Benjovsky, T. D.
Sandusky, S. C.

**Sapinero**—Kilbourn, W. D.

**Telluride**—Peregrine, W. D.
Schoder, W. P.

**Trinidad**—Bacca, J. P.
Berkovitz, Sam
Bunger, M. E.
Davis, G. S.
Reed, C. E.

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Carper, A. F.
Evans, R. B.
Jones, F.
Moss, C. O.
Peck, J. A.
Stotesbury, M. W.
Tippett, J. M.

**Wagon Wheel Gap**—Collins, S. B.

**Walsenburg**—Chatin, A. H.
Krier, E. J.

**Wheat Ridge**—Davis, J. R.

**White Pine**—Dick, J. E.
Nylund, J. E.

**Woodrow**—McNeill, N. M.

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**Wilmington**—Greensfelder, N. S.
Marvin, T.
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Mayer, W.
McWhorter, C. E.
Parkinson, G. H.
Parkinson, L. J.
Pearce, J. W.
Raymond, H. M.
Roberts, K.
Robinson, E. W.
Starbird, E.
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Whitehouse, H. D.

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Dakin, F. W.

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Garnett, G. H.

**Herrin**—Pfeiffer, G. N.

**Granite City**—Ward, M. H.

**Kankakee**—Wagner, R. E.

**Momence**—Chatfield, Ray

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# THE COLORADO SCHOOL OF MINES MAGAZINE



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M. R. (MONTY) BUDD, '24, Editor

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VOLUME XVI — AUGUST, 1926 — NUMBER 4

# CONTENTS



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# *Are You Going to Be Too Busy?*

ALL we want of you alumni right now, and all we're writting this special message for, is to get you back home. Not that we think you've been spending ten nights in a blind tiger and need salvaging. Nope, not that. Not that "all is forgiven," because we have nothing to forgive. Not (altho it's a fact) that Mines will be on fire when you do get home—on fire with enthusiasm over the battle of battles with University of Colorado which will be won or lost before your very eyes at Brooks field—nope, not that. Not that we think you have been mucking too hard and need a rest. Nope, guess again. Do you give up? We are asking you to come back home so that we can get a good look at you, and so that you can get a good look at us. Just to be sure of it: Tuffy and Pi, Pete and Chet, Steve and Ed, Billy and Frank, will all be there, not to mention Tom, Dick and the well known and handsome Harry. And if you're not back, they will all be wondering what's become of you. Probably you will have given one of them this message: "Tell them I'm sorry that I can't make it. But I'm too busy?"

Yes? You're too busy? If you can't come home to Mines once a year the chances are you are too busy. The one or two days that it would be necessary for you to take in order to get back are going to break your life if you throw them away on a return trip to your Alma Mater and your host of college friends—of course. The whole world will be just naturally consumed with brimstone and wood alcohol if you leave the office for one day. Honestly, do you believe that? Then why not give yourself a little vacation and come back with the rest of them?

Have you forgotten the green lawns and that long climb from down town to the Chem building? Have you grown too old to remember Paul's place where the keg was never empty and the steins were always full? Have you forgotten the sweet aroma of Golden on a spicy autumn day when the leaves were turning? Have you forgotten the sight of hurrying men dashing across the campus just after eight, trying to make class after the ding dong of the bell had resounded like a locomotive alarum thruout the campus?

Have you forgotten watching the team trot out on the field while you clapped your hands and made Clear Creek canon reverberate to the sound of the "Mining Engineer?" Have you forgotten those days of days? If you don't miss those thousand and one little things that used to tug at your heart, for goodness sake, hang up the mouthpiece to the dictaphone, hang up the "Gone for the Day" sign, hang up everything you don't need and come back to Golden before it is too late. And don't forget, SHE likes those dances too and SHE liked to cheer at those games of yore —so give her a chance and let her come home with you.

Now, fellows, you know how it is. You say to yourself, "I'll go another time." "I'll be sure to be back next year." But those 365 days go on and on and before you know it, the time has passed again and there is another Homecoming and another "I'll make it next year." And the next thing you know, you're out of touch.

"Tomorrow and tomorrow and tomorrow
Creeps in this petty peace from day to day,—"

Come on, you Miners, break it up. Come home this November sixth. Tom, Dick and the well known Harry will be on deck to greet you. Why should you do a Rip Van Winkle? Perhaps some of you don't know some of the buildings, but don't forget the old Chem building is here. It's right here where you left it when you packed up your books and prepared to march out and take one great big fall out of the world. Certainly. You left Mines for something new, something bigger, something better. Well, old timer, stop counting and hiding your eyes. Come home, come home, wherever you are. Don't to be "too busy."

Mines-Boulder Game, Brooks Field, 1925, when Homecoming Alumni Got the Big Thrill of the Year as the Orediggers Held Their Formidable Opponents, Only to Lose in the Final Five Minutes of Play. Watch the Miners This Year!

# Geophysics Course Is Introduced

*Colorado School of Mines is First College in Country to Establish Course; Dr. C. A. Heiland, Famous German Expert, Engaged to Head Department; Classes Begin Second Semester*

WHAT is considered to be one of the greatest achievements in the advancement of technical engineering education in American colleges and universities was effected on September 14, when the board of trustees, in special session, acting with President Coolbaugh, voted to establish a department of geophysics in the Colorado School of Mines, and retained Dr. C. A. Heiland as professor and head of the department.

To John H. Wilson '22, of the Pan-American Oil company, goes a good part of the credit for securing Dr. Heiland. It was through him that Dr. Coolbaugh learned that Dr. Heiland was open to an offer.

For some time Dr. Coolbaugh and the board have felt the need of such a course in the school, but the great demand for expert geophysicists in the field, and the fact that there are only a small number of these men in the world, gave rise to very keen competition for their services with the result that none of them were available to colleges. However, Dr. Heiland was finally induced to head the department at this school, and the board of trustees with Dr. Coolbaugh are to be congratulated upon their success.

Dr. Heiland is a graduate of Heidelberg university, and obtained his doctor's degree at the University of Hamburg, Germany. For the past few years he has been connected with the Askania Verke, manufacturers of geophysical instruments, in Berlin. For several months he has been representing his company in the United States, introducing geophysical instruments and doing consulting work for the purchasers of the instruments. He is a geophysicist and scientist of international repute and is one of the greatest authorities on geophysical methods in the world today. It is the idea of Dr. Heiland to foster research work in geophysical methods, and at this time he has completed and nearing completion, several important research problems dealing with this science. He is the author of one of the most comprehensive general articles dealing with instruments and methods for the discovery of mineral deposits, which has yet appeared in English. (Eng. & Min. Journal Press, vol. 121, pp. 47-48, Jan. 7, 1926; Eng. & Min. Jour.-Press, vol. 122, pp. 59-61, July 10, 1926.)

Commenting on Dr. Heiland's talk delivered before the Rocky Mountain Association of Petroleum Geologists recently, in which he gave a summary of geophysical methods in relation to oil and oil location, Dr. Coolbaugh says, "He is a great teacher and lecturer. He presented his subject in a clear and concise scientific manner and was easily understood by the entire assemblage.."

Dr. Heiland has left for Germany to close up his affairs with the Askania company, and will return to Golden within two months to take up his duties at the school.

As soon as instruments are available, practical and theoretical courses in geophysical methods will be started. However, it is not expected that actual work will begin before the second semester and this will be open to seniors and special students.

The addition of this new department is of vital importance to Mines men, especially those majoring in mining and geology, and it is believed that there will be a large number of applications for enrollment in the courses.

# Social Fraternities Announce Pledges

*Greek Letter Societies Select Large Number of Freshmen for Pledges; Many Colorado Youths Named*

The social fraternities announce the following pledges:

**Beta Theta Pi**

Anderson, C. S., Los Angeles, Calif.; Jensen, A. C., Edmonton, Alberta; Larson, R. C., Denver; Renfro, E. A., Bartlesville, Okla.; Roberson, R. H., Punk City, Okla.; Stonebrook, W. H., San Diego, Calif.

**Mu Epsilon Tau**

Knox, Clifford C.; Williamson, Jack; Geiskeing, M. W.; Viland, Kenneth; Condit, E. C., Denver; Dickey, K. W.; True, C. I.; Knox, C. C., Loveland, Colo.; Griswold, D. H. Leonard, Sherman, Raton, N. M.; Speirs, G. H., Tooele, Utah; Smith, F. D., Houston, Texas; Bohner, L. H., Brighton, Colo.; Rice, E. C., Grantwood, N. J.; Lloyd, J. P., West New York, N. J.; Burden, Kenneth, Nebraska.

**Sigma Nu**

Ackroyd, Harry, Chicago, Ill.; Dove, Franklin, Arlington, N. J.; Gadell, Allen, Denver; Knill, Lester, Lafayette, Colo.

**Sigma Alpha Epsilon**

Eads, H. E.; Ruggles, George, Greeley; Donnelly, Lloyd; Drummond, Fred; Russel, Robert, Denver; Fentress, Arthur, Norfolk, Va.; Lockett, George, Springfield, Ohio; Lyons, Daniel, Los Angeles, Calif.; Smith, Harry, Memphis, Tenn.; Wolf, Joe, Denver; Wheeler, Edward, Ouray, Colo.

**Kappa Sigma**

Beeler, Henry; Hawkins, George; Schnars, Sheldon J.; Sharp, Paul G., Denver; Brown, L. Coleman, New York City; Conger, H. Lawton, Adel, Iowa; Manhart, Thomas; Manhart, Ashton, Castle Rock, Colo.; McGraw, Charles E., Bailey, Colo.; Moulder, John H., Tunjunga, Calif.; Mullins, Ralph, McAllester, Okla.; Moore, Clarke, Trinidad, Colo.; Shenk, Norman A., Medford, Mass.; Dix, Ed., Lakehurst, N. J.; Underhill, James, Idaho Springs; Purdum, J. F., Golden.

**Sigma Phi Epsilon**

Bell, J. H., Madison, Wis.; Bein, H. H., Los Angeles; Moran, W. T.; McIntyre, George; Watson, E. B.; Sanderson, H. S., Denver; Hall, S. A., New Jersey; Knight, C. W., St. Louis, Mo.; Blume, F. R., Emerson, Nebr.; Morris, William, Chattanooga, Tenn.; Hoppes, E. J., Indiana.

**Etga Omega Delta**

Choquette, Stephen; Littleton, N. H.; Wood, S. B., Sag Harbor, Long Island,; Kennedy, J. S., Denver; Gommel, C. F., Glendale, Calif.; Mears, G. H., Lamar, Colo.; Vander, Veer, H. J., Washington, D. C.; Bladholm, Eric, Englewood, Colo.; Plummer, William H. Jr., Marble, Minn.; Deutsch, H. M., Strathmore, Calif.; Hanson, Rolf H., Tacoma, Wash.

# College Heads Outline Needs

*Request Retention of Building Mill Levy and Slight Increase in Financial Support; Oppose State-Supported Junior College and Favor California Plan*

(Present at the meeting at which this resolution was passed were: Charles A. Lory, State Agricultural College, president of the Colorado State Association of Institutions of Higher Learning; M. F. Coolbaugh, State School of Mines, Golden; George W. Frasier, State Teachers College, Greeley; George Norlin, State University, Boulder; Samuel Quigley, Western State College, Gunnison; Ira Richardson, Adams State Normal, Alamosa.)

"WE, the representatives of the State institutions of Higher Learning, associated together for the purpose of coordinating the work of all these institutions and of considering the educational needs of the state as a whole, desire to inform the people of the state that, in spite of every economy we know how to practice, the demands of our people upon these institutions for service and the attendance of students have increased so rapidly, and are so steadily increasing year by year, that we cannot go on doing the work required of us without asking for an increase in the revenue for operation and for an extension of the building millage which was levied in 1917, for a ten-year period.

"Our attendance has more than doubled in a few years and the floor space per student is now less than it was in 1917. It is hardly necessary to say that when the tax levy was made ten years ago no one could anticipate that the enrollment would reach this present mark or that the purchasing power of the dollar for building purposes would be cut in half.

"Our problem for operation is no less difficult from the growth of our student bodies, and with the salaries which we are able to pay we find it increasingly difficult to go into the open market and employ first-class men against the higher salaries paid in other states.

"We are, in a word, in imminent danger of going backward.

"We know from past experience that our people want their educational institutions to be of the best and, therefore, we cannot do otherwise than put our problem squarely before them.

"Knowing the general financial situation as we do, we do not dare to ask for what we feel, as we observe the progress of like institutions in other states, that we need in order to keep pace with them.

"Since this is the situation, we desire to raise the question in all good faith and with no selfish purpose, whether the policy of the state in adding from time to time to the number of educational institutions before being able to make adequate provision for those already existing, is a wise one; whether it does not tend to reduce the whole system of higher learning in Colorado to mediocrity.

"We feel that until the state is in a better financial condition, any extension of public higher education should be confined to encouraging the establishment of Junior Colleges in localities which can afford to support them.

"We call attention to the fact that the Junior College, as it exists in this country, is either a privately endowed two-year college, or a public institution. The public Junior College is virtually an extension of the system of public secondary education, being a district or community institution, established and supported like a High school, by the locality and not by the state. In California the public junior college gets a subvention from the state of so much per student enrolled, but the locality must provide the grounds, buildings, equipment, and at least half of the cost of operation. We think the California plan would not be unreasonable for Colorado.

"But if this state should adopt the policy of thus recognizing and contributing to the Community Junior college, we believe that such a policy should be safeguarded, as it is in California, by a statute prescribing the conditions of population and wealth under which any locality may establish such a college, in order that the locality may be able to carry its part of the enterprise upon which it desires to embark.

"We realize that this statement is susceptible of misconstruction but we believe that we speak without selfish prejudice and in the interest of sound higher education in Colorado."

## Changes in Faculty

A NUMBER of faculty changes have been announced by President Coolbaugh. The resignations of Dr. Albert Low, head of the department of chemistry, and of Will Norris, associate professor of chemistry, have been accepted. Dr. Low will enter the commercial field in Denver and Dr. Norris has accepted a position as manager of Olinger's real estate department.

Robert A. Baxter, assistant professor of chemistry, is named associate professor and two instructors, Clarence Knudson and L. W. Harkemeier, have been added to the department. Knudson is a former Denver young man and a graduate of Denver university. He has been teaching at the University of Nebraska for the last two years. Mr. Harkemeier is a University of Minnesota man and has done considerable chemical work for the Minnesota highway department and the Great Northern railway, in addition to teaching work at the university.

Professor Peterson, who has been in the English department for the past two years, resigned to take a position with Washington State university. His place has been filled by the appointment of J. W. Kirk, of Boulder, Colo., as assistant professor of English. Prof. Kirk received his A. B. degree in Indiana university and his Master's degree from Colorado university. He formerly taught in Indiana and during the past three years has been in charge of the U. S. Veterans Bureau students at C. U.

G. W. MacHamer '22, was appointed as instructor in geology to take the place left vacant by the resignation of M. C. Kiess. Keiss has gone into commercial work with the Pure Oil company. MacHamer has not arrived in Golden yet and will not take over his position for an indefinite period due to a nervous breakdown.

G. D. Nichols, of the University of Nebraska math department, was appointed last spring to take L. D. Hampton's place.

## Frosh Win Tug of War

*First Year Men Take Rope From Sophomores and Duck Sophs in Creek; Order Restored at Barbecue*

COMPLETELY organized and outnumbering their sophomore rulers, the freshmen were victorious in the annual tug-of-war across Clear Creek just before school opening. In the evening, the sophs upheld the honor of their class by subjugating the frosh in the merry barbecue. The Oredigger, school weekly, writes up the events as follows:

The tug-of-war on Thursday afternoon found the freshman ire fully aroused and also well-directed and generaled by a few agitating upper classmen. After a series of gruelling naval engagements beneath the Washington avenue bridge, the frosh and sophs were finally marshalled into places on opposite sides of the creek and the rope stretched between them by the student council representatives in charge. The separation of the prospective football men from among the freshmen was of decided advantage to them, as this group formed a husky vanguard in the rush which later took place across the creek against the sophs. The upper classmen in charge of the affair finally got the sides supposedly even and the tug-of-war started. The Sophs were just holding their own in the pulling when at a signal all the freshmen let go of the rope and made a concerted rush across the creek. The sophs were hopelessly outnumbered in hand-to-hand combat and it was only a few minutes until the frosh had captured both ends of the rope and started up town with it. In their rush to get up town to proclaim their victory they left about twenty of their number behind, and upon these disgruntled sophs relieved their wrath. The afternoon was one of jubilation to the frosh for they had accomplished something which had not been seen for years.

That evening when the time for the barbecue came, only twenty-four sophomores could be assembled to up-hold their class honor. To combat these an equal number of frosh were chosen and the rest taken to the side lines to watch the fray. In this contest the superior knowledge of the second-year men was evident, and it was a complete sophomore victory in spite of the heroic resistance from the frosh. In the allotted time the twenty-four freshmen were trussed up and carried to the assay laboratory.

The winning of the barbecue restored the prestige of the sophomores lost by thei rdefeat in the tug-of-war.

## Freshman Week a Success

*Many Frosh Come Early to Receive Many Valuable Pointers Before Rush of Registration Begins*

ONE of the features of the year was "Freshman Week," a four day period, from Sept. 3 to Sept. 6, to allow new students to become acquainted with the school. The new men received talks and instructions on general subjects concerning Mines that greatly aided them in registration.

The success of the period was so apparent that it will be given annually. Although the move is an innovation in Rocky Mountain collegiate circles, it is in accord with the practice of the leading colleges of the country including Michigan, Penn State, Stanford, Dartmouth, California Tech and many others. The purpose of the pre-school session is to assist new men to accommodate themselves to the new environment, to effect a better organization for the year and to become acquainted with the faculty and upper classmen before the rush of school duties begins.

The freshman period which was inaugurated this year by President Coolbaugh was highly successful and served its purpose admirably. Professors J. R. Morgan, J. F. O'Byrne and E. P. Martinson were in charge of the plans and they are to be complimented for the excellent manner in which the freshmen were handled.

The freshmen first were assembled Friday morning, Sept. 3, about 115 reporting. After a get-acquainted period, talks were given by Dr. Coolbaugh, Dean Grant, Phil Doerr and George Duvall of the city of Golden. The rest of the morning was spent in visiting the parts of the school. A lunch was given by the school at the Hotel Berrimoor and the freshmen were assembled in the afternoon. A talk on athletics was given by Coach Courtright. Kuno Doerr talked on fraternities, and Ladner explained the honors which could be earned at Mines. Saturday morning talks were made by Dean Grant and Max Ball and Dr. Smiley of the Board of Trustees. In the afternoon the library was inspected and a talk on library privileges was made by Miss Hoyt. An auto trip and beefsteak fry had been planned, but rain spoiled this idea. However, a lunch was served in the gymnasium that evening. The freshmen also were taught Mines yells and songs.

Later a reception was given by Dr. and Mrs. Coolbaugh in Guggenheim hall.

## Summer Military

*Mines R. O. T. C. Unit Wins Many Prizes at Camp During Summer; Miner Is High Shot*

ALL honor and glory are due the forty-two juniors and sophomores who attended summer R. O. T. C. camp at Fort Sam Houston this summer. They were the only engineering unit represented, and in competition with such

The Mines unit lost the decoration of colors for military discipline and general appearance of unit and quarters during the first week, but they took the honor the second week and they held it the remaining five weeks of camp. They showed up especially well in the shooting, qualifying 32 per cent against 22 per cent for the next highest school. J. H. Seaver was the only man in the camp to make expert rifleman and he received a gold metal for high score. John Dyer, Walt Lofgren and C. A. Smith made sharpshooters rating.

In camp athletics the Miners baseball team tied for first place, but lost in the play-off. Bob Much won the shot put and made second in the javelin throw.

The engineering unit from this school was given an intensive course in all branches of military engineering. They built foot, pontoon and heavy timber bridges, constructed field works and erected wire entanglements, and were given school credit for work in railroad surveying.

The fellows managed to make flying trips from San Antonio to the border and they all managed to find their way out of Mexico. A great many men drove from Golden to Texas in relic flivvers and they tell weird tales of their travels and conquests. The camp at San Antonio was most successful for the Miners from every standpoint.

# Making Rock Drills for the World

*Denver Rock Drill Co., One of Denver's Leading Industries, Makes Drills That are Sold Everywhere; Factory is Model of Cleanliness and a Credit to Denver*

AT East 39th avenue and Williams street, Denver, are located the shops and offices of the Denver Rock Drill Manufacturing Company.

To the casual passerby, whose eye rests on the well kept lawns, the shrubs and flowers, and the vinecovered buildings, there is little to suggest the commonly accepted idea of a "factory," with its connoted dirt and grime, smoke and fumes, noise and confusion.

The beauty and orderliness of the exterior are a pleasant surprise to those who hold that the establishment of manufacturing enterprises in Denver are an offense against the aesthetic, and demoralizing to property values.

Orderliness and neatness are scrupulously maintained throughout the entire plant, and in the same way as these characteristics are indicative of the merits of the individual, so do they reflect in the products of an enterprise.

Many people in Denver are unacquainted with this important local industry, yet its doors are constantly open to visitors who are always courteously received. In a trip through the plant, the layman, as well as the expert technician, can find much that is interesting and instructive.

In size the plant is perhaps not as impressive as the large establishments of the East, but in methods and process, in quality of materials, in accuracy of workmanship, and in practical production methods, it is second to none.

Five hundred men are at present employed, and thousands of different parts required for assembly into thirty different products, are in process in the plant. Materials move rapidly from the storeroom to the various machines where the prescribed operations are performed, inspected, moved to the next station, yet nowhere is there the slightest appearance of confusion. On the contrary, one cannot help absorbing the impression of perfect co-ordination and quiet efficiency.

Accuracy appears to be the one fetish in the plant. Quality of product is the prime consideration. After each minor operation on every part, the work is carefully inspected, and finally the finished piece is given a complete inspection before going to the shipping room. A full stock of parts is kept on hand, subject to call from branches or agencies in all parts of the world, or for use in the assembling of the various products.

The painstaking care exercised to make each piece of undeviating accuracy and quality has gone far towards the establishment of the present excellent reputation of "Waugh" drills, and has engendered confidence on the part of all customers for satisfactory service.

The development of the rock drill has had an important influence on the rapid progress of science, art, and industry during the last half century. If it had been necessary to continue the employment of phimitive methods to the extraction of silver, copper, lead, zinc, iron and other essential metals and minerals from the bowels of the earth, the enormous modern demands of industry could not have been supplied, and progress would have been inevitably rearded.

Rock drilling machines were first produced in England and Germany in 1844 and 1853. They were used in driving the Mt. Cenis tunnel in Switzerland in 1861, but so unsatisfactory were the crude original types that as a matter of historical interest, it is recorded that it was necessary to have two hundred machines on hand in order to keep sixteen in operation.

A drill invented by Fowle, of Boston, was the first American made. This was subsequently improved by Burleigh, whose drills were used in driving the Hoosac tunnel in Massachusetts in 1866. Improvements by Ingersoll, Sargent, Githens, and Leynor followed until in 1897 the prototype of the present hammer drill was developed.

It appears that the earlier machines, possibly on account of weight and unwieldiness, were used chiefly in tunnel driving. Not until about the 90's was there an extension of their field of utility to cover all rock drilling conditions met in mining.

The Denver Rock Drill Manufacturing Company was incorporated in 1907. The first product of this company was a new type of machine called a stoping drill, invented by Waugh. The success of this machine in Colorado and throughout the States started the company on a solid foundation. Since that date, rock drills of all types and sizes have been added to the "Waugh" line. Other kindred products, such as drill steel sharpeners, scraper hoists, both air and electric, concrete breakers, clay diggers, oil furnaces, etc., have been added from time to time.

Production facilities, both plant and equipment, have been constantly augmented to take care of growing demand. Domestic branches as justified by territorial conditions have been added one by one. Foreign connections have been made in Mexico, Canada, Chile, Peru, Japan, England, South Africa, Australia and New Zealand.

From a modest start in 1907, the Company has grown to the position of one of the leading manufacturers of rock drills in the world. Its products are probably even better known in the four corners of the earth that in Denver. Each shipment reminds the world that Colorado, is on the map, and claiming attention.

Such rapid growth is a fine tribute to the judgment and energy of Mr. W. H. Leonard, president, whose guiding hand has controlled the destinies of the company since its inception, and to the able and aggressive management of Mr. A. H. Skaer, vice-president and general manager.

As previously stated, the present output affords employment to over 500 employees, with a payroll of over one million dollars. The products are used in base and precious metal mines, coal mines and quarries, by municipalities, public service and transportation companies, on hydroelectric and water projects, for tunnel driving, sewers and trenches, in practically all quarters of the globe.

The are used extensively in driving the Moffat tunnel, and in other tunneling projects of greater or less magnitude. In such work the class of service is particularly gruelling, because rapid progress is the prime consideration. In the selection of equipment for such large undertakings, the contractor's choice rests with the machine which promises the greatest speed, power and durability.

It is apparent from the foregoing list of outlets for the company's products that the business is tied up with the basic industries, and is not influenced by the variations which affect specialty or luxury lines. This fact coupled

(Continued on page 14)

# Foot Ball Season Starts

*Mines Eleven is not Championship Contender, but is Capable of Winning Games; Frosh Material is Excellent; First Game with D. U.; Homecoming Nov. 6*

(By Monty Budd)

FIRST of all, let's get down to brass tacks on the football situation. We have good prospects; no chance for a championship; a strong line but a mediocre backfield; Volk and Graham are gone and we have no one to take their places; but we have the old fight and a team that will make every team in the conference know that it knows how to fight.

The frosh are strong. How powerful, no one knows at this writing, but to the writer, who has seen teams here since 1920, the material is the best frosh material we ever have had in seven years. There is not a McGlone in the bunch, but there are a few Crawfords. A Crawford, personified by Ron Crawford of recent fame, is a lineman who is good and who knows how to fight to the last ditch. There are too few Crawfords.

As for Coach Courtright. The Alumni voted him a promise of confidence at the last annual meeting last year. He has not had a real chance and will require at least another year in which to prove definitely that he has the goods.

The men who are fighting it out this season are good men and most of them are hard football players. We are fortunate to have Doug Shaw back again. He is one of the best field generals in the conference and one of the best defensive backs we have had in recent years. This year he is stepping right along and is rapidly becoming a good ball lugger. Another letterman, Bob Bond, is in the backfield. Bond is potentially a great player. He is a good booter, has worlds of speed and is a good open field runner. However, he is weak on defense and does not buck the line as fullbacks should. He probably will be shifted to a halfback berth and George Bretschneider, a back in 1921, will be the plunger. Simmons a newcomer, is slated for a job in the backfield and Jenkins a fast, light man is bound to get in most of the games if his fragile shoulder can stand the gaff. Other good backfield candidates are Regan, Potter, C. A. Smith, E. J. Gallagher and Mercer.

The wing positions will be filled by two lettermen, Barney and McArthur. Barney is one of the best ends in the conference and McArthur is in the same class. Adams and Coolbaugh are out for the end jobs also.

The line is strong and heavy. The return of Joe Mcneill, tougher than ever, and faster than ever, means much to the team inasmuch as Blanchard failed to register. Joe is playing guard and is doing a good job of it. Abbott, a former letterman, returned to school and is in fine condition, Walt Lofgren and Bob Waterman of last year's line, are in harness and Capt. Much is holding down the center berth, despite competition from Wells and Purdum. Excellent prospects for the line include Carter, Johns, Mahan, Angus, H. A. Smith, E. F. Gallagher and Haight.

It may be that Mines will spoil the hopes of a few teams. The men have the ability to do wonders.

The feature of this year's schedule is the homecoming day tilt with Colorado University on November 6. It ought to be a great battle and Mines ought to win.

The schedule follows:

Oct. 2—D. U. at Denver.
Oct. 2—D. U. at Denver.
Oct. 16—Greeley Teachers at Greeley.
Oct. 23—Open date.
Oct. 30—Western State at Delta.
**Nov. 6—U. of C. at Golden.**
Nov. 11—Regis at Regis college.
Nov. 18—Open date.
Nov. 25—C. C. at Colorado Springs.

As for other conference teams, little is known. Denver University looks good on paper and Wyoming has a strong aggregation. The Utah Aggie eleven is favored to win the championship. As usual Harry Hughes will have a strong team at Aggies and Witham will have a contender at Boulder, Colorado College has a new coach, Van deGraff, who may make the Bengals a real team.

## Hinds of Aggies

*Ervin Hinds, Former Aggie Star, Named Assistant Coach in Football, Boxing and Baseball*

ERVIN Hinds has been hired as an assistant coach to Courtright for the coming year. Hinds is well known in this conference, having received his B. S. degree at Colorado Agricultural college in 1923. He made an enviable athletic record while at Aggies in football, baseball and boxing. He was all-conference end his last year of football, played baseball four years, making all-conference two years, and was 175-pound boxing champion for four years. The battle between Hinds and Volk in 1923 will long be remembered by fight fans.

He attended the Illinois university coaching school in 1923 which was handled by Dobie and Zuppke, and was coached by Jones in 1925 at C. T. C. In 1923-24 he coached at Yuma High school, turning out a football team which lost only one game to Fort Morgan, 7 to 6. His team was second in basketball and third in track. He has coached for the past two years at Eaton. His team was runner-up for the state championship losing the final game to La Junta. Five men were chosen from his team on the all-conference eleven.

Hinds is serving under Courtright as line coach. With Hinds as a coach our championship boxing team should repeat again this year.

George A. Allen, all-eastern tackle, will coach the frosh team. Allen played on Dartmouth's famous "Big Green" eleven.

This summer Courtright attended Fielding Yost's summer school at Ann Arbor. Courtright has gone to school under the best coaches in the country.

## Flash

Denver University 27—Mines 7
Colorado Aggies 53—Mines 0

# Low Cost of Education

*Colorado School of Mines Educates at Low Cost, Refuting Inaccurate Statements to Contrary*

IN view of the fact that inaccurate statements concerning the cost of education at the Colorado School of Mines have been appearing recently, the exact figures will no doubt be of interest to all taxpayers of the state.

The Colorado School of Mines has cost Colorado taxpayers less than $3,500,000 in its 52 years of operation, dating from the establishment of the institution by the territorial government in 1874 and extending to 1926. In round numbers, this represents an average expenditure of $67,300 per year, a very low cost for the high grade service rendered to the large number of students who have attended the School. Although the School has cost taxpayers less than $3,500,000 during its existence, this sum is greatly reduced when the current assets of approximately $1,000,000 are deducted from the total. When comparison is made with other technical schools of the country, the low operating cost of the Colorado School of Mines is brought out most forcibly.

It is not to be inferred that the School is operating on $67,300 per year at the present time. A comparison of expenditures, however, for 1913, a normal pre-war year, and 1925, is very enlightening. In 1913, expenditures were $98,889,23. In 1925, the sum of $258,202.13 was expended, representing an increase of 216%. During this period, the enrollment increased from 211 in 1913 to 465 in 1925, an increase of 120%. The department of Petroleum Engineering was inaugurated in this interim at the demand of industry. This necessitated additional equipment and an increased faculty. The number of students enrolled in this department at the present time is second only to the registration in the metal mining department. When the decreased purchasing power of the dollar is considered with the additional enrollment and the creation of a new department, 1925 figures can not only be reconciled with those of 1913, but indicate that the taxpayer is getting more for his money than he was in 1913.

At the same time the value of the school property has advanced from approximately $800,000 in 1913 to $1,038,355.16 in 1925. In this connection, attention is called to the fact that of the $3,500,000 spent on the School by taxpayers in the past 52 years, a very substantial amount is represented in school assets.

As a matter of information, it should be understood that the act creating the Colorado School of Mines states that no tuition shall be charged bona fide residents of the state.

Public records from the state auditor's office, as shown by the report of the public examiner, and the published School of Mines biennial reports, are the sources of all figures used in this article.

# Capt. Lorence Writes

*Has Pleasant Trip to Philippines and Enjoys Life at Islands; Was Military Instructor Here*

THE editor has received an interesting letter from Capt. Walter E. Lorence, commander of the Mines R. O. T. C. unit from 1921 to 1925. The former commandant and Mrs. Lorence, who made many friends at Golden, are in the Philippines, where Capt. Lorence is serving with the U. S. Army. Portions of the letter follow:

"We had an extremely interesting trip to the Philippines, with a fair amount of stop-overs. During the trip we spent three days in Panama, six days in San Francisco, two days in Honolulu, and one day at Guam. Sailing out of New York on October 28th, we landed at Manila on December 15th. We landed in Manila during the best season of the year, weather similar to that of Colorado in early summer. This fine weather lasted until April 1st when the hot season commenced. We are still in the midst of the hot weather. Hot? Of course it is, but so is it in the States at times, and besides out here our evenings are usually cool and pleasant.

"I was fortunate in my assignment out here. Instead of joining my regiment, I was played on temporary staff duty at Department Headquarters. Since than I have been permanently assigned at Manila as the Assistant Department Engineer and the Assistant District Engineer in charge of defensive work of the Philippine Islands. The combination of staff and technical work is fascinating and I am extremely thankful for the opportunity.

"In additional to the professional advantages of being at Headquarters of the Philippine Islands, the social activities of Manila are charming. The Army, the Navy and the Foreign Colony sets all mingle together and the parties at the various clubs are more like movie settings than those of real life.

"In the tropics we work from 7:00 a. m. until 1:00 p. m. Lunch, and then a siesta for an hour or so. After that everyone gets out-of-doors. Mrs. Lorence and I vary our afternoons by riding horse-back, golf, tennis and swimming. Except for the rainy season we have outdoor sports all the year around. Just think you can go to a base ball game nearly every day of the year.

"When you want to get about town you hop into a 'calesa,' a two-wheeled buggy drawn by a miniature horse and it costs only 10c; and only 30c for the hour, no matter whether there is one, two or three passengers.

"Rents in town are high, higher even than in the States. But that is off-set by the servant problem. We have a houseboy, cook, laundress, and nurse girl for less than the price of one in the States. If you don't like what you have you simply fire them and hire others, as there are hundreds ready to take their places. As an example, just think of having a boy do all the house work for $10.00 a month or a girl to do the laundry, mind the children and any other odd jobs you can think of, for the same price.

"Manila is an interesting community of the old and the new. You can find any nation of the world here and especially of the Orient. You can see native, white or oriental sections in the race and combination of all.

"We ourselves live at Department Headquarters in Fort Santiago in the heart of the Walled City. From here we can branch out into all parts of Manila."

Sincerely yours,

WALTER E. LORENCE,

Qtrs. 5B, Fort Santiago, Manila, P. I.

## Colorado Section

*W. Traver Jr., Secretary, 634 S. Williams St., Denver, Colorado*

THE first meeting of the Colorado Section was held July 23 at the Albany Hotel with 24 alumni present. The meeting was called to order by George B. Clark '01, secretary of the parent association. Organization started with the election of officers and James Dudgeon was named president and Wm. Trayer Jr., secretary. President Coolbaugh gave a splendid address on the conditions at the school.

The second meeting was held August 20 at the Albany with a representative of the Tramway Co., as principal speaker. More than thirty attended this session.

The third meeting was held at Hotel Berrimoor, Golden and about forty were in attendance.

Those who attended the first meeting were: Geo. B. Clark, Walter Ailinger, James Dudgeon, C. O. Parker, Karl Reynolds, W. A. Peabody, R. Higgins, W. C. Page, Tooele, Utah, William Simpson, William Traver Jr., H. C. Beeler, A. L. Toenges, Fort Smith, Ark., A. H. Stewart, W. J. Berry, Donald Dyrenforth, J. R. Morgan, C. L. Colburn, Albert Wolf, Gulf, Texas, C. R. Vorck, L. R. Van Burgh, Will Coghill, Dr. Coolbaugh and Monty Budd.

Meetings will be held regularly the last Friday of every month. If you are in town at any time get in touch with the secretary.

## New York Section

*Harry Wolf, Secretary, 42 Broadway, New York City*

THE New York Section of the Colorado School of Mines Alumni Association will hold a meeting early in August, whereafter we have something of interest to report. In the meantime, I am enclosing herewith a copy of our mailing list of Mines men in and around New York City. This list is subject to change without notice, as corrections are reported.

During almost every week throughout the year, some Mines men visits the secretary's office, and in this way, we learn of many changes of address and occupations. It is our plan to keep a systematic record of these visits hereafter so that we may report changes of address that may be of interest to you.

## Southwest Section

*F. A. Brown, Secretary, 601 Higgins Bldg., Los Angeles, California*

YOUR letter of June 30th has had my thots for the last few days. I can think of nothing of great interest to write you for the August issue of the magazine, but you may note that although we do not have meetings down here very regularly, we are nevertheless all interested in reports which we obtain from time to time on the doings at Mines.

We were all badly broken up over the death of "Stew" Henderson. The casualties among our late schoolmates has been something awful.

Hank Fidel is still with the Shell Company at Brea as gas engineer. J. C. (Itch) Herron is now with the Pan-American Petroleum Company. Vincent Peet is athletic instructor of the Los Angeles High school. Eros Savage has been married for over a year now and is very well fixed with the Shell Company in their Research Department at Signal Hill. Rooney is with the General Petroleum Corporation of California. The Brooks Brothers are with the city and county in engineering work, and Mulford is also with the county.

Every once in a while we meet someone from Mines here. The other day I had customer come in whose name was Frank A. Humphrey, and I find that he is ex-Mines '08 and is now managing a little property out here on the desert. Prof. Roberts of the Chemical Department was in last week for just a few moments. He was on his way to San Francisco to finish out his vacation.

I will be glad to do anything possible in the way of furnishing you information for the Magazine and will try to get this into you in plenty of time.

Your idea regarding definite meetings each month will receive our consideration. So far we have been unable to find any place here where we could assure ourselves of a table should we have more than half a dozen turn out. I will make a try at this however the next time we have a meeting.

You will no doubt be interested to know that Eros Savage is now the proud father of a baby girl. Also I have just heard that "Brick" Harroun has gone down on his father's ranch in Arizona to put in an irrigation system.

## From Old Mexico

IT is with pardonable pride that we print the following letter from F. Erich Bruhn '22. He is with the Ingersoll Rand Co. of Texas at 409 Edificio Palavicini—Bucareli No. 12, Mexico City, Mexico. The letter follows:

"Upon my return recently from a trip into the far southern parts of Mexico I found the May and June numbers of the 'new' Colorado School of Mines Magazine.

"The appearance of the new Magazine is very neat and there is certainly no reason why every alumni shouldn't kick thru with a buck and a half a year for a magazine like that.

"In the May number on page 17 under the list of the 'missing' I can give the following information:

"Arthur D. Swift can be located thru Ingersoll-Rand Co., 706 Chamber of Commerce Bldg., Pittsburgh, Pa.

"Keith P. Hurley's address is care of Ingersoll-Rand Co. of Texas, 718 Mills Bldg., El Paso, Texas.

"I am planning on returning to Golden for a visit in November and am looking forward to the trip with much pleasure."

## Mines Men Meet

A letter from Theodore Marvin '22, managing editor of The Explosives Engineer is interesting. Extracts follow:

"While attending the Cincinnati meeting of that day in May, of the American Mining Congress, I arranged a dinner for the several Mines graduates who were there. These members were M. F. Cunningham '24, B. E. Price '23, and F. W. Kirby '22. Others in attendance at the convention were N. S. Greensfelder '12 and Hugh T. Finley ex-'21.

After leaving Cincinnati I visited with Hugh Finley at Proctor, Tenn., where he is general superintendent of the Proctor Coal company. He is now busy with the preliminary work of opening up a part of the valuable virgin coal lands owned by his company.

Several weeks ago I had an interesting trip into the mountain country of East Tennessee and northwestern North Carolina. This area, in which are the Great Smoky mountains, has recently been created a national park."

# *WEDDINGS*

**Parkinson-Neibling**

Lucius J. (Lute) Parkinson '23, and Miss Margaret Elizabeth Neibling were married June 27, at Broken Arrow, Oklahoma. Lute and Mrs. Parkinson will make the trip to Belgian, Congo, where Lute has been employed for the past three years. He is a Beta, Theta Tau, Tau Beta Pi.

**Epenter-Lannon**

Gus Withers Epeneter ex-'20, was married on June 26, to Miss Ruth Lannon, of Denver, at the Broadway Baptist church. Miss Lannon is the daughter of Mr. and Mrs. Franklin P. Lannen and is a graduate of the University of Colorado and a member of Pi Beta Phi sorority. Gus attended Mines and belongs to Sigma Alpha Epsilon. The couple are residing in Pueblo where Gus is engaged in business.

**Higgins-Howard**

Robert Higgins '17, was married June 4, to Miss Ruth Howard, of Warrensburg, Mo., at Phoenix, Arizona. Mrs. Higgins is a graduate of Missouri University. Higgins is a Sigma Nu. He is employed as a salesman by the Sullivan Machinery Co. The couple are making their home in Denver.

**Eslick-Downie**

Louis Eslick ex-'24, of Denver, was married to Miss Lucile Downie, of Denver, at Golden, on July 19. Mrs. Eslick attended Ferry Hall in Lake Forest, Ill., and also the University of Colorado. Louis came here from Rockwell, City, Iowa and attended the University of Iowa before coming to Golden. He is a member of Phi Delta Theta.

**Gilkinson-Holland**

Warren Gilkinson, '23, was married on June 15 to Miss Luella Holland, of Denver. John Reddin '24, was best man and ushers were Charles Baroch '23 and William Freeman '23. Following the ceremony, they left for Old Mexico where Warren is employed by Phelps-Dodge.

**Linn-Waldo**

H. K. Linn '20, was married July 12, to Miss Evelyn Waldo, of Denver, at the home of the bride's parents. Mrs. Linn is a graduate of Loretta Heights and is a talented musician. Karl has been working in Belgian Congo for the past three years and is returning with his bride for another three year stretch.

**On The Way**

Announcement has been made of the engagement of Dorothy Hauk, of Denver to E. Paul Evan '26, of Coalton, Colo. The wedding is scheduled for early in the fall.

# *DEATHS*

**Robert Rolando, '29**

Lieutenant Bob Rolando, of the 120th air squadron of the Colorado National guard and a sophomore at the Colorado School of Mines, met death September 29, at Lowry field, Denver, when the airplane he was piloting crashed to the ground. Rolando died in an ambulance while being taken to a hospital. Sergeant Clyde Plank, flying with Rolando was badly hurt. According to witnesses of the accident, Rolando had circled the field at low altitude shortly after taking off. Apparently he was trying to rise when the ship went into a spin and crashed on its nose near the northern boundary of the field. Rolando was one of the most popular men in the School of Mines, and he also had many friends among the townspeople, as his accommodating gentlemanly ways brought him into great favor. His parents live in Haledon, N. J. Rolando first came to the School of Mines in 1923. After finishing his freshman year, he was forced to stop school and seek employment. He returned here this year to re-enter school, in the sophomore class. He was working his way through school, being very ambitious to gain his degree. He was 23 years old. Rolando was an aviator of much experience. This summer he gained considerable fame in the Ford reliability tour, when semi-conscious from ptomaine poisoning he piloted his plane through fog and rain and made a safe landing after flying from Fort Wayne to Cleveland.

**Harold Fulenwider ex-'19**

Harold G. Fulenwider ex-'19, died June 7, at Oxnard, Calif., following an appendicitis operation. He was 29 years of age and had lived in Denver until a few years ago when he went to California to engage in business. He attended the Colorado School of Mines until the United States entered the war when he enlisted in the Aviation Corps. He was a member of Beta Theta Pi fraternity.

**Reuben T. Covey Jr. ex-'19**

Reuben T. Covey Jr., ex-'19, 38 years old, a former resident of Pueblo, died at the home of his father, R. T. Covey, at Los Angeles, Calif., on June 17. He was a graduate of Pueblo Central High school in 1905 and later attended Mines ,transferring to the University of Colorado where he received his degree. He had resided at Los Angeles for 16 years.

**George T. Herbert '22**

George T. (Ted) Herbert '22, died June 21, at Lebanon, Penna. He had been employed as a mining engineer by the Bethlehem Mines Corp., a subsidiary of the Bethlehem Steel Corp. He was 27 years of age. He was the son of Mr. and Mrs. Charles G. Herbert, 410 Riverside Drive, New York City, and the brother of Charles V. Herbert.

**Edward Krekel '26**

Edward Krekel '26, who was appointed instructor in chemistry, was drowned on August 10, this summer while swimming in Long's lake, north of Golden. It is believed that he was stricken with a heart attack while he was attempting to reach a raft in the middle of the lake.

President Coolbaugh and other Mines men arrived on the scene soon after his body was recovered. A short funeral service was held in Golden and the remains were shipped to his home in Cleveland, Ohio.

Krekel had obtained his degree of Master of Science from the School of Mines last May and had been named as an instructor in chemistry following graduation. He received his Bachelor of Science degree from Case School of Applied Science. Krekel was popular on the campus and was a member of Tau Beta Pi and Theta Tau fraternities.

**DANIEL HARRINGTON DIRECTS SAFETY WORK**

According to advices received from Director Turner, of the Bureau, Daniel Harrington, '00, consulting engineer of Salt Lake City, Utah, began his duties as Chief Engineer of the Safety Service of the U. S. Bureau of Mines on August 1. Mr. Harrington stood at the top of the Civil Service list, which numbered 44 approved applicants. Mr. Harrington is a native of Denver and was graduated from the Colorado School of Mines in 1900. He served as Chief Engineer of the Utah Fuel Company and as Superintendent

(Continued on page 14)

# PERSONAL NOTES

**O. B. Suhr '95,** of Deep Springs, Calif., accompanied by his son, visited the office recently. Mr. Suhr has been in the east in the interest of the preparatory school at Deep Springs.

**Marshall Draper '97,** consulting engineer, has changed his address to 2126 Mayview Drive, Los Angeles, Calif.

**Oscar A. Lampe '98** mill and cyanide superintendent for Guanajuato Consolidated Mining and Milling Co., Apt. 33, Guanajuato, Gto., Mexico, was a recent visitor at the school.

**Walter E. Burlingame '01** is in charge of the work on the Smuggler mine, located near Rollinsville, in Gilpin county, Colo. At present he is supervising the overhauling and cleaning of the main tunnel, preparatory to an active campaign of new development.

**John T. Stubbs** receives his mail at Box 384, Orange, Texas, where he is engaged in geological work.

**G. M. Butler '02,** dean of college of Mines and Engineering at Tucson, Arizona, visited Golden friends late in June. He attended the session of the national Kiwanis club convention in Denver.

**L. E. Trumbull '04,** consulting engineer of Denver, visited the school recently.

**Arthur C. Terrill '05** of the firm of Burns and Terrill, consulting engineers, of Los Angeles, now resides at 340 Lexington Drive. His firm address is 310 N. Ave., 23, Los Angeles, and the partners are specializing in research.

**W. O. Chamberlain '05** of 734 Grant St., Denver, was visiting at Golden last month.

**F. C. Carstarphen '05,** consulting engineer for Manufacturers and Selling Co., Trenton, N. J., called at the office in September.

**Frank J. Reinhard '05** was recently elected Grand Master of the Colorado Masons. By the way, his son, Frank Jr., has entered the freshman class at the University of Colorado.

**Prof. J. F. O'Byrne '05** and family spent part of the summer at Jarbridge, Nevada.

**Marvin Kleff '06,** consulting engineer of Leadville, finds occasion to visit the school and alumni office regularly.

**C. T. Emrich '09** is at 728 Stanley Ave., Long Beach, Calif., where he is vice-president of the Pacific Paper Box company.

**Will Hammond '09,** of Saguache, Colo., where he is cashier of the Saguache County bank, visited Mines early in September.

**G. S. McKay '10** has changed his address from Isidro, Chih., to Apt. 13, Chihuahua, Chih., Mexico, where he is general superintendent of El Potosi Mining Co.

**Alan Kissock '12,** with the Climax Molybdenum Co., of 61 Broadway, New York, was a recent school visitor.

**J. L. Emrich '12,** now a minister, was a recent visitor in Golden where he attracted a great audience as he preached at the local Presbyterian church. It is understood that he is a candidate for the pastorate vacancy.

**Arthur Swanson '13,** of Globe, Arizona, visited friends in Golden in July.

**William Lloyd Beck '14** has changed his Chicago address to 449 Waller Ave., Fuller Station. He was formerly located at 5605 Fulton St.

**Norman Maxwell '17** has resigned his position with Duvall-Davison Lumber Co., Golden, and has accepted a position in the mining game as assistant to **Charles Harrington '12,** consulting engineer at Idaho Springs, Colo.

**G. M. Cheney '17** is with the Andes Copper Co., Castilla B, Antofagasta, Chile. He recently sent in his Magazine subscription renewal.

**Fred Serviss '20,** instructor in geology and mineralogy at the Catholic University of America, Washington, D. C., has been retained on the staff of Ruebsam and Stevens. Civil, Mechanical and Structural Engineers, of Washington, D. C.

**C. L. Boeke '20** has changed his address to Apartado 85, Parral, Chihuahua, Mexico. He formerly was addressed at Capitan No. 1, same city.

**Will V. Norris '21,** associate professor of chemistry has resigned his position and is now manager of Olinger's real estate department in Denver.

**William Horatio Brown '21,** instructor of geology at Tucson, Arizona, spent a few weeks in Colorado during August.

**Ethelbert Reed '22** has returned from Old Mexico and is now at Trinidad. He was a recent office visitor.

**H. H. Pratley '22,** Mine foreman at the Chief Consolidated is the proud father of a son, Henry Hart, Jr., born May 4th.

**Don Valdez '22** and **Hugh Connors '22,** were recent callers at the office. Valdez has just returned from Torreon and Connors is employed at the Denver mint.

**Al Jenni '22** has accepted a position as draftsman with Phelps-Dodge Corp., at Morenci, Arizona. The position was obtained through the Capability Exchange. Jenni resigned his position with the Southern Colorado Power Co., of Pueblo, Colo., which he has held since graduation.

**William M. McGill '22** was a recent visitor at the office.

**Clarence Guth '22,** who is connected with the Westinghouse Electric Co., at Pittsburgh, Penna., spent the summer with his parents, Mr. and Mrs. Henry Guth, in Golden.

**Theodore Marvin '22** spent a few weeks in Colorado this summer. He spent most of the time at Silverton reporting on a mining property there.

**Frank Sistermans '23** has resigned his Mexican position and is enjoying a rest at his home in Los Angeles where he receives mail at 623 East 27th St.

**J. Harlan Johnson '23** was doing geological work for the Midwest Refining Co., at Carrizozo, New Mexico, for part of the summer and for several weeks gave a course in geology at Colorado Aggies.

**Charles Parker '23,** who has been with W. E. Burlingame for a number of years, has been taken into the business and their card now reads: Burlingame and Parker, Chemists and Assayers, 1915 Lawrence St., Denver, Colo.

**John L. Yates '23,** instructor in mathematics and descript at Washington University, St. Louis, Mo., was a recent visitor at the office.

**Frank Fairbairn '23,** is with the Aco Mining Co., at Breckenridge, Colo. **Hollis Joy '24** is at the same place.

**James O'Neill '24** is foreman at Gossan Mines, Monarat, Virginia. The company is the General Chemical Co., and **Frederick Foote '14** is general superintendent.

**Monty Budd '24,** made a short trip to Carrizozo, New Mexico late in August, driving down to Roswell with **Paul McCune '24,** who makes the trip quite often for the Midwest Refining Co. **Arthur Fosdick '23** is a member of McCune's party at Roswell.

**Frank Storms '24,** salesman for Ingersoll-Rand Co., was in Golden in August, spending a few days before leaving for South America. Looking the same as ever and still possessed of the line that can sell anything to anybody at any time, Frank was a sight for sore eyes. He gave us all the dope on Florida, particularly in regard to Miners there.

**E. M. Tiffany '24** has moved evidently. Mail addressed to him at 1066 Hollywood Ave., Salt Lake City, has been returned.

**Maxwell Pellish '25** is Colorado representative of Gano-Downs Co., of Denver. He represents the store at all campuses in the state. While at Mines he built up an excellent foundation for this work.

**Wilfred Patterson '25** recently received his Master's degree from Wyoming University.

**Louis Cotulla '25** has moved from Thurber, Texas, to 209 Eleanor Ave., San Antonio, Texas.

**A. S. Wyner '25** has moved to Cape Girardeau, Missouri. He formerly was addressed at 2312 High St., Denver, Colo.

**Frank Delahunty '25** former football captain has resigned his position with the Inland Steel Co. He stopped off in Golden a few days on his way to the coast.

**Constantine Stephano '25,** now a graduate student at M. I. T., spent a few hours in Golden during the summer visiting old friends. Accompanied by his father he was making an independent inspection of mines and mills of the west.

**John Christopher '25,** shift boss at the Utah Apex in Bingham Canyon, was recently appointed playing manager of the Utah Apex baseball team of the 'Copper' league, the fastest non-professional baseball organization in the state.

**Michael P. Fominyh '26** has left Englemine, Calif., to accept a position in the engineering department of Inspiration Consolidated Copper Co., Inspiration, Arizona. His mail should be addressed to Box 38.

**Gaylord Weaver '26** has accepted a position with the U. S. Gyspsum Co., at Southard, Oklahoma.

**Parke Huntington '26** has accepted a position with the Midwest Refining Co., as assistant geologist.

**Melford Salsbury '26** has accepted a position at Baldy, New Mexico. His permanent address is 915 South Downing St., Denver, Colo.

**Constantine Ivanoff '26** is with the Wellington Mines Co., at Breckenridge, Colo.

## PARRAFIN IN OIL WELLS

Engineers attached to the Dallas, Texas, field office of the Bureau of Mines, Department of Commerce, have devoted some time to fractionating samples of crude paraffin taken from oil wells in the Hutchinson County field in that state. It is intended to fractionate the samples of "paraffin" from a number of fields and to compare the index of refraction, melting point and carbon-hydrogen ratio of each fraction. The percentage of asphalts, asphaltenes, oil and different fractions of wax in each crude "paraffin" sample will be determined.

**ROCK DRILLS FOR THE WORLD**

(Continued from page 7)

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**HARRINGTON APPOINTED**

(Continued from page 11)

of the Big Horn Collieries Company, Crosby, Wyo. In 1914 he entered the service of the Bureau of Mines as mining engineer, and in 1920 was made supervising mining engineer of the Bureau, from which office he resigned in 1924 to take up private work in Salt Lake City. He has been consulting safety engineer for the United States Fuel Co., and the Utah Fuel Co.

## CHANGE OF ADDRESS

My new address is_____ Position_____

My old address was_____ Position_____

Name _____ Class _____

Remarks: _____

_____

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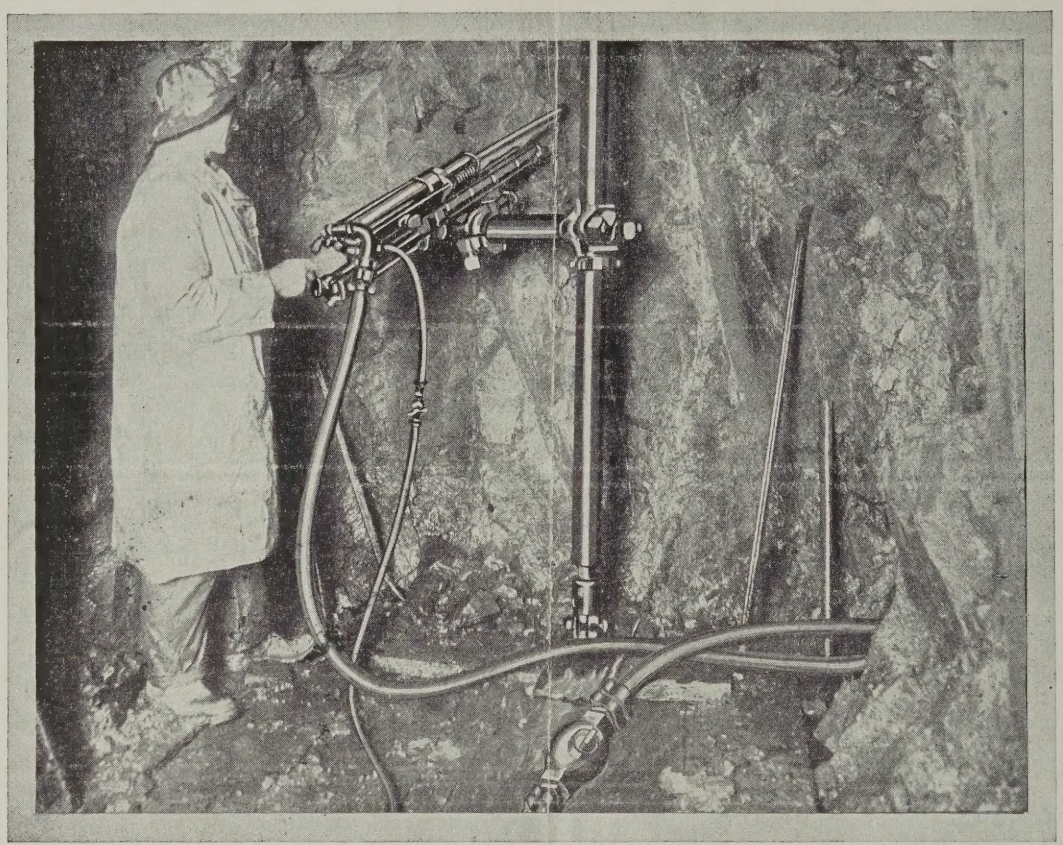

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